N-33

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

TUESDAY, APRIL 1, 1986

Morning Sitting

SELECT COMMITTEE ON ENERGY

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Brandt, A. S. (Sarnia PC) for Mr. Jackson

Clerk: Carrozza, F.
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Witness:

From the Natural Resources Defense Council:
Cavanagh, R., Director, Energy Projects

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Tuesday, April 1, 1986

The committee met at 9:45 a.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY

Mr. Chairman: Members of the committee, I welcome you once again. This is our second series of hearings. We are calling it phase 2 because it leads up to our final report, which we will be issuing near the end of May or early part of June. It is a fairly intensive timetable we have planned for the next three weeks. I would appreciate your attention, attendance and certainly the timeliness of your attendance, so we can start promptly at 9:30 in the morning, start promptly in the afternoon and therefore adjourn on time. That would be very helpful.

With that in mind, I ask Brent Snell briefly to outline for us where we are going in phase 2 before we call our first witness.

Mr. Snell: I have some brief introductory remarks to kick off phase 2 of our hearings before we call our first witness, Ralph Cavanagh. Copies of my slides are available from the clerk, if anyone would like to have a hard copy of them or look at them.

There are four main things I want to do in my introductory remarks. I want to refresh everyone's memory on the reasons behind our review, outline the key objectives of our review, preview the key issues we will be addressing throughout the next three weeks and outline our schedule and approach to the issues we are trying to attack.

We chose to review the demand and supply options for Ontario for two main reasons: first, the concerns raised during part one of our hearings when we reviewed Darlington; second, the major study going on within Ontario Hydro on demand and supply options for electricity in Ontario.

In our review of Darlington, we felt--and it is stated clearly in our report--there was a lack of data on the demand-side alternatives to Darlington. We felt the Darlington hearings focused primarily on the coal alternative to the nuclear option rather than on a major alternative on the demand side. Second, some concern was raised about the delineation of operating and policy-making responsibilities between Ontario Hydro and the government as Hydro moves into some very large public policy issues with the new planning process it is involved in.

We heard about Hydro's conclusions and some of its findings in phase 1 of the study it is involved in, the demand and supply options study, DSOS, as it calls it. We found it is the most comprehensive review of demand and supply options Hydro has ever done and there are very important implications of this study for the future of electricity planning in Ontario. We also found its process of reviewing demand and supply options involved an assessment of public values, something we thought was a legitimate concern of the select committee.

The four primary objectives we would like to accomplish during this phase of the hearings of the committee are: to give direction to Ontario Hydro concerning its demand and supply study, which is going on now; to look into and make recommendations, where necessary, on the issues related to electricity options in the broader energy policy environment and to look into a lot of issues related to electricity demand and supply options that are beyond Ontario Hydro's boundaries; to make recommendations on issues which may arise concerning the legal and institutional framework within which the options are made, if these kinds of issues are brought up during our hearings; and to finalize our position on Darlington, especially units 3 and 4. As you recall, in the phase 1 review of Darlington, we left some questions hanging which we hope to answer during this phase.

I would like to review with you some of the things the committee has been doing between the last set of hearings and its report on Darlington and the hearings today.

We have consulted with a large number of key players and interest groups in Manitoba and Quebec and throughout the United States from California to the northwest to the eastern seaboard, as well as with a number of energy experts, consultants and interest groups throughout Ontario. We mailed letters to more than 60 interest groups inviting submissions and we received 15 back. That number may be higher now. Our staff researchers have been summarizing these briefs, and a summary of the submissions we received is appended to the discussion paper we have issued, which is available to anyone who would like a copy.

We have also commissioned independent reviews of Ontario Hydro's study itself of hidden costs and subsidies behind the different electricity options in Ontario and of the potential for conservation in Ontario. The people who have carried out these studies will present them throughout the next three weeks and we will hear the results. They are independent studies which the committee commissioned to have an independent view.

We also held a discussion session in Niagara-on-the-Lake for a couple of days during which we reviewed a discussion paper on the issues, which subsequently has been made available to the public. As I mentioned earlier, copies are available to anyone who wants one. During that discussion session, we arrived at four or five key issues we would like to address during the hearings.

First, we would like to consider the key criteria and their priority. What should the key criteria be in evaluating options for Ontario? Second, how do we ensure that societal values, the noneconomic or difficult-to-quantify values, are incorporated into the planning process? Third, how do we ensure that all options are treated equally when we are looking at a very wide range of options with varying lead times, costs and potentials? We would like to take a look at ensuring that, as much as possible, they are considered equally in the planning process and in the general marketplace. That is something the study we commissioned on hidden costs and subsidies should be able to illuminate for the committee, at least whether they are being treated equally in the general marketplace.

More specifically, there is a question which overhangs the whole hearings, that is, is there a future for large generating stations for nuclear and coal in Ontario? That is something we will be addressing throughout the hearings. We will be hearing the views of both the nuclear construction industry and advocates of the soft-path approach.

Finally, we would like to take a look at the appropriate role of government and what it should be in Ontario's demand and supply options study. They are taking a look at a number of issues that are a lot broader and more wide-ranging than ever before.

To briefly overview our schedule, there are four main parts. We have already gone through the first part, week one, a discussion session, a day and a half of presentations and wide-ranging discussions among committee members. This week we will be taking a look at Ontario Hydro's planning approach, hearing from Ontario Hydro and people who are coming forth to give independent comments on that planning approach and on the demand and supply options study.

9:50 a.m.

In the third week we will be taking a look at some of the key options. We will focus primarily, as I will show you, on contentious issues in the options. Finally, we will close with four or five days on the decision-making framework in the role of government.

Today we are going to hear from two speakers on an overview of utility planning before we hear from Ontario Hydro so that we have something to compare it with. What is going on in the United States? What kinds of concepts are being adopted now? What is the state of planning in other jurisdictions?

For two days we will be hearing from Ontario Hydro on its planning process, on the demand and supply options study, on its corporate strategy and on its public consultation process. It will be closing that off with a summary of the issues that it is facing now.

On the final day of this week we will go into a full day of critique or comment on Ontario Hydro's planning process in the demand and supply options study. Don Robinson was the gentleman we commissioned to review Ontario Hydro's study. John Robinson, Terry Burrell and Ralph Torrie are well-known energy critics in Ontario. They will be working together to talk about forecasting, planning on the demand side and trying to put the development of Ontario's planning into perspective.

In the second week, when we review options, we will be spending a whole day on demand-side alternatives. We will be hearing from people on independent generation, on cogeneration from a person who actually owns and operates a small hydro site, and from energy services firms as well as building and appliance standards.

On the final day we will be hearing from advocates from the nuclear construction industry, as well as the renewable energy council. It will be wrapped up by presenters from Pollution Probe, which ran a forum called Energy Forum '86, which took a look at a wide range of demand-supply options for Ontario. They will sum it up that week and will present the findings of that conference, in which Ontario Hydro and a number of other groups participated.

In the final week we will start the review of the decision-making framework. I hope we can get a representative from the Ministry of Energy to outline what that framework is and to talk about the Power Corporation Act and the powers of government as they exist now. Then we will talk about the hidden costs and barriers. Mike Berkowitz is the individual who did the review of hidden costs and subsidies for us. We will also be hearing from the Ontario Natural Gas Association.

Then we will hear from a variety of different perspectives. We will hear from the regulators' perspective, the government perspective and the utilities' perspective on the planning approach, on bringing about least-cost planning and on adopting some of the newer planning technologies that exist across North America.

On the second last day we will hear from a number of groups on policy proposals, Energy Probe and Steve Schrybman from the Canadian Environmental Law Association. We will be bringing forth their ideas about changes to the framework for decision-making in Ontario. We will also hear from the Ontario Energy Board and the Ministry of Energy. This morning I heard the date may be changing for the Minister of Energy (Mr. Kerrio) to appear. As soon as we firm that up, we will issue a new schedule for you.

On the final day Ontario Hydro will be wrapping up, giving a response to the testimony heard to date, commenting on Darlington at that time, and reviewing the key issues. With that brief introduction, I would like to introduce our first speaker, Ralph Cavanagh from the Natural Resources Defense Council in San Francisco.

Mr. Chairman: Good morning, Mr. Cavanagh. Welcome and carry on please.

NATURAL RESOURCES DEFENSE COUNCIL

Mr. Cavanagh: Good morning. I appreciate the opportunity. I should begin by saying a word on the perspective from which I approach these issues.

I am employed by the Natural Resources Defense Council, as the director of its energy projects. NRDC is a national nonprofit environmental organization in the United States. As a consequence of my work there since 1979, I have been appointed to teach courses on electric utilities at Stanford University and Harvard University law schools and I have provided advice on utility planning to groups as diverse as the US Department of Energy, the New England Electric System, the Northwest Power Planning Council, the state of Washington and the province of Manitoba.

Much of my work has been in the US Pacific Northwest and California, the areas that have accumulated the greatest experience with what Mr. Snell called "least-cost planning methods" generally and utility-financed conservation programs in particular. As part of that work, I participated in the design and execution of the most extensive community-scale conservation program ever undertaken in the United States under utility sponsorship.

If you indulge the habit of a some-time teacher, I should emphasize that questions while I am speaking are always in order, at least as far as I am concerned. I hope to spend a good deal of my time this morning at the close of my presentation answering questions from the committee.

In your letter, Mr. Chairman, you asked me to address four matters: first, a brief review of the evolution of planning concepts and technologies; second, the concept of least-cost strategy and how it is applied in different jurisdictions; third, how utilities deal with uncertainty, such as the uncertainty of demand conservation programs and so forth; and, fourth, how noneconomic social factors are dealt with in the screening process.

Let me begin with a little history.

Mr. Sargent: Where does the word "defense" come in?

Mr. Cavanagh: In the organization for which I work, the word connotes a commitment to try to preserve and enhance environmental quality, sir.

Mr. Sargent: As opposed to energy attack.

10 a.m.

Mr. Cavanagh: That is correct, presumably. I will leave to you, in terms of the presentation I am making, the sense in which that fits here.

For much of the era following the Second World War, utility planning was really quite straightforward. It was the place to go if you wanted a quiet life and a good deal of spare time. Real costs in the sector dropped consistently, and throughout the North American continent, and certainly in Ontario, every year brought the reassuring news that demand was up by another seven per cent, plus or minus a few tenths of one per cent. Demand was basically more than doubling every decade, but no one worried about it because, again, costs were dropping. The task of the planner was essentially to put a ruler down on a piece of graph paper and draw a line, which indeed is what many utilities did.

Beginning in the early 1970s and through the middle of that decade, as costs rose, utilities increasingly felt the need for more sophisticated planning tools, which they found in what are called econometric methods that are incorporated in computer programs and that focus on historic relationships between energy use and such general economic variables as gross national product, personal income, numbers of households, energy prices and employment. The models basically fit those past trends together and project them into the future. It is the same kind of extrapolation-from-the-past philosophy the old graph-paper methods used, but is considerably more complicated and requires a good deal more hardware on the computer side.

Since the introduction of those methods, we have had time to assess their actual performance in the field. I think it is fair to say the universal consensus has been that econometric methods do not work very well. We can take one example right here from Ontario, developed by this committee, which determined in its first set of hearings that forward looks at this province's needs in the year 2000 have differed by as much as 56,000 megawatts, double the province's total installed capacity today, depending on when the projections were made.

Ontario is hardly unique in that respect. When I started my work in the United States Pacific Northwest in 1979, it was an absolute article of faith in the utility community, based on econometric forecasts, that the 1980s would be a decade of rationing and rolling blackouts in Washington, Idaho, Oregon and Montana and that shortfalls in 1986, to pick a year at random, would be equivalent to the annual output of about five Darlington-sized nuclear reactors. It is now 1986, and the US Pacific Northwest is trying to export firm surpluses of power, unanticipated, of course, by those econometric forecasts. They are equivalent to the annual output of more than three Darlington-sized nuclear reactors.

I wish I could say the prospects for econometric forecasters are improving with experience and time, but there is no evidence for that despite bigger and better computers and bigger, if not better, econometric models. Extensive assessment of forecasting accuracy published in 1985 in the utilities trade press and cited in the paper I have presented to this

committee found "little or no evidence that the accuracy of utility forecasting is improving over time."

Also in 1985, Ontario Hydro acknowledged, with what I must say is refreshing candour, that there was a gap of 13,000 megawatts between plausible high-case and low-case forecasts of provincial needs at the turn of the century. In Hydro's own terms, 13,000 megawatts is six times the power produced by the Canadian side of the Niagara. Moreover, again by the utility's own reckoning, there was only a 60 per cent chance that provincial needs in the year 2000 would in fact fall somewhere within even that enormous 13,000-megawatt range. Similar accounts can be given for systems throughout the North American continent.

For the United States as a whole, the gap between recent high-case and low-case forecasts by the US Department of Energy was a sobering 300,000 megawatts. As a consequence of all this--and I am sure this committee has already seen some evidence of it--there is a positive obsession with uncertainty in utility circles throughout North America, a general concession that the old forecasting tools just are not reliable enough to sustain decisions about multibillion-dollar supply investments with lead times of a decade or more. That, of course, is precisely the unpalatable decision posed by the traditional base-load supply options: large-scale coal, nuclear and hydraulic units.

One can respond to the situation I have just described in two ways. One is to throw up one's hands and say: "Life is uncertain. The world is difficult. We will muddle through somehow." The other, and I submit the more rational approach associated with what I will be calling least-cost planning for the purposes of this presentation, is to try to do two things. The first is to refuse to take for granted that disabling uncertainty is a fact of nature and to try to reduce those uncertainties about future system needs to the extent it is possible to do so, or at least to investigate whether that is possible. The second is to try to reduce the costs, scale and lead times of the supply options so the system is more flexible, lighter on its feet and better capable of dealing with the residual uncertainties that are going to be there no matter what you do.

Those two steps taken together--the focus on reduction of uncertainty and the focus on increasing flexibility--are the essence of what I will describe today as the least-cost planning concept.

In understanding that concept, the one additional thing it is useful to preview briefly is the special role it assigns to conservation. Let me be clear on terms at the outset. By "conservation" I do not mean getting by with less, cutting back on amenities or freezing in the dark. I mean, and least-cost planners generally mean, improvements in the efficiency with which electricity is used. The classic example is something such as building an upright, frost-free, 18-cubic-foot refrigerator that keeps food at the proper temperature while consuming half or one third the amount of power used by the typical upright, frost-free, 18-cubic-foot refrigerator.

Another term least-cost planners use continually that I will use today is "end use," by which they mean a function that electricity performs, such as refrigeration, lighting or process heat. The first and perhaps most critical least-cost planning insight was that improvements in end-use efficiencies can be converted into an energy resource, a supply option, if those improvements can be achieved in substantial quantity on a predictable schedule managed by the utility system. In the western United States, we have spent the past eight

years learning how to do that. From a system planning perspective, this is a supply option that has some significant advantages if you can make a work--a big if.

The first set of advantages it has goes to what I referred to earlier in terms of flexibility, scale and lead time. The conservation option can be added in small packages, not indivisible, 500-megawatt or 1,000-megawatt units. It comes on line within months or years as opposed to decades. It is a much more adaptable strategy for dealing with a rapidly changing environment.

The second and less widely appreciated advantage of conservation as a supply option is that it acts directly to reduce uncertainties about future consumption. It goes right after the central obsession of the utility industry today and it does that in the following fashion. By reducing the electricity needs of houses, appliances, commercial buildings and industrial processes, utilities can diminish the significance of fluctuations in economic trends from the standpoint of ultimate electricity needs.

To illustrate, if you can use regulatory and incentive processes to fix the average needs of new houses, appliances and commercial floor space at levels far below those typical of current practice, then your errors in predicting the absolute number of new houses, appliances and so on become much less significant in terms of the system's actual electricity consumption. Instead of trying just to predict electricity needs using tools of proven inadequacy, utilities and their regulators can act to shape those needs with conservation.

10:10 a.m.

Mr. Snell: I want to raise a concern brought up by the utility perspective, Mr. Cavanagh, and have you address it at this time. To some people, conservation is less certain because it involves predicting consumer behaviour. To them, it increases uncertainty in the planning process rather than decreasing it because it is dependent on variables outside of their control.

Mr. Cavanagh: Sure. If utilities remain uninvolved with conservation, then it is just another element adding to the overall uncertainty. If Amory Lovins is right about the immediate potential for conservation savings on the system, then Ontario Hydro faces not 13,000 megawatts of uncertainty, as it thinks, but more probably something in the order of double that figure.

By intervening on the conservation side, I am suggesting, and the least-cost planning methodology reveals, utilities can take an active hand in shaping how much conservation comes in and how fast and, as a consequence, can begin to get hold of that additional feature of uncertainty on the whole planning spectrum.

Also, it is extremely important not to confuse the kind of conservation I am talking about with behaviour. Remember, I am talking about concrete hardware improvements in the efficiency of devices and buildings that use electricity--something that is capable of being measured and delivered in programs on the ground. Shortly, I will get to the actual empirical experience we have had in delivering those concrete hardware conservation improvements on the ground in the regions that are doing this kind of planning.

As I said, one purpose of the exercise, which I will walk you through in a moment, is to determine how much of this kind of demand management, this kind of active conservation investment and intervention, is worth doing from the standpoint of minimizing total system costs for the utility while ensuring adequate supplies of power for a growing economy.

Remember again, the purpose of these methodologies is not to starve the system for electricity. The practitioners of these methods are as vigilant as anyone can be about making sure there is enough power available for vigorous economic growth in the event that is what materializes.

Mr. Polsinelli: May I ask one thing about the conservation option?

Mr. Cavanagh: Yes, of course.

Mr. Polsinelli: While I can see that is a clear option for a government-owned utility working under the direction of a government, where is the profit incentive for a privately owned utility?

Mr. Cavanagh: Profit incentive can come in several ways. First, it can come in if the utility is avoiding investments in generation that are more expensive than the conservation it is purchasing and--a crucial "and"--if it is permitted to earn a return on the investment it makes in conservation.

In our American western systems, our investor-owned utilities that are active in conservation are allowed to recover their costs from the ratepayers just as they recover the cost of power plants from the ratepayers with a return. As a whole, ratepayers are better off. By definition, the conservation selected for insertion in the rate base is cheaper than the equivalent power plant being displaced. That is a crucial point. Obviously, for it to make sense for utilities to do this kind of thing, they have to be able to recover costs. As in any other sector, there is no free lunch.

I do not wish to be Pollyannaish about conservation investment. It is possible to make mistakes at every stage of the process. A crucial part of the effort you are contemplating here in Ontario is to collect other people's mistakes so you do not have to repeat them. Mercifully, the scale of mistakes here, like the scale of conservation resources itself, tends to be considerably more modest than is true on the generation side. None the less, let me emphasize the point at the outset and go into it with that caution.

It may be useful if I try to take you briefly through what a least-cost planning process looks like in terms that do not require reference to computer models or, I hope, any kind of totally unintelligible technical dialogue.

Consider a typical utility system--and Ontario would fit this description--that is dominated by large base-load plants with high fixed costs and relatively modest operating costs. If the system had confidence that its existing facilities could sustain internal needs and any export commitments indefinitely, there would be no reason to worry about investment in conservation or any source of new electricity supply. In general, current forecasts here and elsewhere provide no basis for that kind of confidence.

The crucial question then becomes whether conservation and other forms of demand management can reliably substitute for new generation at lower cost. That is where we begin. Answers to that question require, as a first step, a forecast that is tied as directly as possible to the actual instrumentalities of demand, the existing and anticipated end uses of electricity. You have to

root the forecast there--not in terms of overall societal trends in income, population growth, households and employment but in the actual instrumentalities of electricity consumption. That is, after all, where the demand comes from.

The system must, in effect, take inventory of its residences, appliances, heating systems, commercial floor space and industrial processes, securing estimates of both absolute numbers and average efficiencies. You do not have to go out and count every building in every industrial process. Obviously, you can use survey techniques, and utilities in the US that do this have developed fairly extensive survey instruments if you need them. That is a crucial first step.

The next step is to develop high-case and low-case projections of additions to those inventories during the period of the forecast. You start out and you know what you have in electricity-consuming devices and buildings; you know their average efficiencies. But if you are projecting into the future, you also have to think about additions to the inventory in all sectors. Again, you have to look at both high-case forecasts with rapid economic growth and low-case forecasts of more modest but still plausible developments.

You are going to come out of that exercise with a forecast that looks like two diverging jaws. You are going to have the high case shooting up, a low case stable or shooting up very slowly and a widening gap between them, just like the gap I described earlier for the current Ontario Hydro forecast, but with one crucial difference. Remember, the new forecast is rooted firmly in the actual instrumentalities of demand, which allows you as planners to begin to track the effects of investment and policy designed to upgrade the efficiency of some or all of those instrumentalities. You have a forecast that you can begin to use for policy purposes as opposed to a pure econometric forecast that is keyed to variables over which you have very little control.

Now comes the series of steps that really defines the least-cost planning exercise. Once you have your diverging high-case and low-case forecasts locked into your inventories of electricity-consuming devices and buildings, the crucial issue to start with is to get a comprehensive assessment of opportunities for improving end-use efficiencies. The question here is, what is the state of the art, existing and anticipated, for delivering the same services performed by the system's current end uses at the lowest possible electricity consumption? That allows you to make a comparison as an initial matter between how much electricity the system would use at top efficiency and how much it is actually using. That gives you some sense of the unexploited potential for conservation.

You are not going to be able to get all that potential, and indeed it is not going to be worth getting all that potential, but it is useful to start with that perspective. Once you start with that perspective, the issue then becomes how much of that unexploited conservation resource you have identified at the outset is worth attempting to secure. How much of it is cost-effective?

How do you answer that question? To do it, you have to have a rigorous way of comparing the life-cycle costs of additional conservation for each end use with the life-cycle cost of the system's most expensive displaceable generating unit in the acquisition plan or perhaps under construction. That is, you have to know what you are in a position to avoid, and you have to compare the cost of what you are avoiding with that of the various options you have on the conservation side. Some of those options are going to be more

expensive than what you are in a position to avoid, and you will probably discard them unless there are very strong countervailing environmental considerations.

In the paper I have presented, I argue that in performing that comparison between the conservation and the avoidable alternatives, you as planners should explicitly credit the conservation for its advantages on indices of scale, lead time and uncertainty reduction, those factors that I have already described, and my submission to the committee includes detailed recommendations on how to do that. But if you ignore those advantages in the cost comparison process, you are effectively saying they do not matter; and if you say that, you are flying in the face of everything the utility sector has learned about the disabling costs of uncertainty and unwieldy scale.

10:20 a.m.

In addition, one of the significant things you should be crediting conservation for in those comparisons is the reduction in system reserves that it makes possible when it avoids new generating resources, when it keeps system demand lower than it otherwise would be. At 25 per cent, Ontario has among the highest reserve requirements of any Canadian or North American utility. That means that when you hold the system at a smaller level through conservation, you are avoiding what is by North American standards an unusually large amount of reserve capacity. That is something you want to be sure to explicitly credit conservation with in this province.

From all this, from the cost-effectiveness comparisons and analysis, will emerge a decision on which efficiency improvements are worth pursuing, which ones are less costly than the alternatives you are in a position to avoid. At that point, what remains is for you, as planners, to determine how much of the cost-effective conservation resource the system can count on securing.

That inquiry focuses on the mechanisms that are available for getting the conservation measures installed. Here, I am happy to say planners can draw on numerous precedents and what is now a substantial base of empirical data on the actual performance of programs in the field. Options run across a wide spectrum of utility-financed incentive programs and government efficiency standards. If you go out and survey what has been done in conservation policy in the field, you can now find extensive work on both the efficiency standards side for government and the incentive side for direct utility financing. For me, what is most exciting is that you can find the two working together. You can find utility-financed incentives making government regulation more palatable, effective and efficient.

A classic example I can draw from the US Pacific Northwest is utilities paying the cost of hiring and training the additional inspectors who are needed to enforce the upgraded building code now being implemented in many parts of the Pacific Northwest. In addition, as part of that phase-in process for the more efficient buildings under the tighter building codes, with utilities also paying the extra upfront cost of houses built to the more demanding standards, the utilities are getting relatively cheap electricity in terms of savings for the system. As far as the regulators are concerned, they are getting the financing they need to make the program work, without additional pain to the taxpayer. The ratepayer is footing the bill. There is no free lunch, but the ratepayer is getting a better deal than equivalent purchases from new generating resources would allow.

If you look across the spectrum of precedent, you can now find in place --again, suitable for use here if you choose to do so--a great deal of experience, for example, on the design of building codes for both residential and commercial sectors, conversion standards ensuring that buildings that move from oil or gas to electric heat are as efficient as life-cycle costs justify when that transfer takes place, and appliance efficiency standards that ensure the worst guzzlers are taken off the market and the system is gradually moved towards higher levels of efficiency, again subject to strict cost justification. Those first appeared in California in 1977 and are beginning to spread across the US.

On the incentive side, again there is extensive precedent for direct payment in the forms of both loans and grants for improvements in the efficiency of existing residential and commercial buildings and new ones. With residential appliances, some of the more innovative programs pay rebates, not to the purchaser of the efficient appliance but to the salesman at the appliance store, which turns out to be a very effective way of diverting consumer attention very quickly to the most efficient appliances on the shelves. In the industrial sector, increasing investment is now going forward, which has the result both of upgrading and invigorating the industrial infrastructure and delivering to the utility savings on which it can rely.

As you look at those options, you are in a position to make some predictions about the likely success of the programs accessible to you as a province in convincing electricity consumers to take advantage of efficiency opportunities. You are in a position to confront Mr. Snell's question of how much conservation we can get; how many people can we convince to do this? You now have a fairly extensive array of experience on which to draw. I have been involved in trying to make some of that data available.

Let me give the committee one example. In the US Pacific Northwest, when we were putting the first least-cost plan together back in 1982 and 1983, a critical uncertainty issue was, how many people in the residential sector can we convince to take advantage of utility-financed conservation measures? Is it 40 per cent, 60 per cent, 80 per cent? It makes an enormous difference for purposes of the forecast.

We decided to run an experiment. We chose a county, selected specifically to be representative of the region in demographics and housing stock. We decided to see what percentage of participation we could get for a utility-financed conservation program that called on people to take extensive action to upgrade the efficiency, in this case, of space and water heat. We went to what effectively were levels of ceiling, wall and floor insulation that had never been used in the Northwest. We also went to low-flow shower heads and a variety of other devices to reduce water heat consumption and to triple-glass windows.

That experiment was recently concluded after a two-year effort. We gave ourselves two years to see how fast we could get the resource on line. Ninety-one per cent of the community participated in the program. The methods we developed to get that level of performance, to ensure quality control was maintained and to ensure the results were widely generalizable all are available to and should be taken advantage of by places such as this.

In addition, the range of empirical experience, of which Hood River is only an example, is something you should take very seriously in deciding what your programs can deliver once you have determined how much conservation is worth buying. Remember, this is the step of the analysis that allows you to

determine how much you can get. Experiences such as Hood River lead me to suggest you can get most of what you identify, but not all of it. If you design the program right, if you take advantage of the best experience on how to get what you are looking for, you can get a very substantial percentage. In the view of the Northwest Power Planning Council, it is between 75 per cent and 90 per cent of what you identify as cost-effective.

Once you have your estimates of how much cost-effective conservation is worth buying and can be bought reliably, you return to the gaping jaws of your initial forecast and you narrow them by inserting appropriate assumptions about increases in the efficiency of end-use inventories for the high and low forecasts that produced the jaws to begin with.

When you insert the conservation, obviously the high forecast and the low forecast both drop, but the high forecast drops substantially more because there are more end uses to upgrade in the high forecast. There are more houses, more feet of commercial floor space and more industrial processes. You have more work for conservation to do. Both forecasts drop. The high forecast drops by more, the jaws narrow, the range of uncertainty is reduced and you already capture significant benefit.

The high forecast at this point represents the maximum plausible post-conservation needs the system is going to have to meet. The low forecast represents the minimum requirements the system is going to have to meet. You still have your jaws; you have narrowed them. The high forecast is now the maximum plausible post-conservation consumption the system could require. The gap between the two forecasts has been narrowed but not eliminated by conservation. There is still uncertainty; conservation is not going to get rid of all of it. That represents a range of outcomes with which the utility must be prepared to deal.

It is going to be useful to think about the enterprise as analogous to buying an insurance policy. You are trying to minimize the cost of preparing to cope with contingencies of varying probability. You know demand is going to be somewhere between the jaws, but you do not know where. The goal is to minimize the cost of preparing to meet those contingencies. You do not know what is going to happen. New base-load units may be part of the response, but a wide range of other options will bear close scrutiny, including shifting load off-peak, purchasing interruption rights from customers and perhaps some peaking in intermediate units.

The more certain the system is that it will need significant post-conservation additions of supply, the better the capital-intensive, low-operating-cost, base-load systems are going to look. The reverse is also true. You will not know until you have made the inquiry.

In a nutshell, that is what the least-cost planning exercises I have been working with in California and the Northwest have tried to do. What both of them have done for those two regions is to defer indefinitely all new central station, large-scale power plants and to put the maximum emphasis of the systems on acquisition of small-scale conservation and independently owned generating resources. That is not to say, however, the system preordains those outcomes. I would not presume to predict what an Ontario exercise would reveal.

There is no question this analysis puts a premium on small-scale flexibility and on uncertainty reduction. You have to decide whether you think that is reasonable. If you take seriously the problems the utility sector has had in predicting demand, and if treating energy consumption is something one

is limited to predicting, these are advantages that will matter a great deal to you.

10:30 a.m.

Mr. Brandt: Can I ask a question?

Mr. Cavanagh: Yes.

Mr. Brandt: You mentioned briefly the concept of shifting demand from peak periods. Ostensibly, that is still the four-to-seven time frame we have heard about on many occasions. Was that a part of the study you undertook in the Northwest to attempt to do that? If so, how successful was the program? How did you go about introducing it to the public?

Mr. Cavanagh: I am sorry I cannot be helpful there for this reason. The Northwest system is a more hydro-dominated system than yours. It is energy constrained rather than peak load. Load shifting is not a significant concern on the system at present. That was not one of the things we tried to do.

Mr. Brandt: So when you mentioned it in the latter part of your remarks, it was just one of the applications that might be available in terms of shifting demand from that peak period but was not necessarily a part of the program you were involved with in the Northwest.

Mr. Cavanagh: No. We have not had to go to load shifting in the Northwest. I should explain. When we were finished this exercise in the Northwest, we basically determined that we could indefinitely defer new, large, central station units and most other generating and load-shifting options if we simply relied on what Ontario Hydro called "strategic conservation." That was enough, coupled with a modest amount of hydro power and some changes in the operation of the hydro system, to get us through at least the next decade.

One of the encouraging things about this kind of approach is the lead times. A decade is not long enough if you are dealing solely with coal, hydraulic and nuclear where you need 11 to 14 years in the Canadian system and more like 16 to 20 years in the American system. For the options I am describing, the lead-time ranges are in months to years; so the power council in the Northwest does not worry much about the future, say seven to 10 years out, knowing it will have time to deal with that when the moment is nearer and when there is more complete information available about what demand looks like.

One of the nice things about these approaches is that they allow you to wait longer, to take a harder look at what is happening in the system, before you commit irretrievably to major new supply resources.

Let me briefly address some of the noneconomic social factors that the chairman raised in his letter to me. I want to mention three: the distribution of conservation benefits, which has been a very hotly contested issue in both Canada and the United States; our environmental costs in benefits; and, finally, what has been called in many of the provinces and the states by the three-word term, the jobs issue.

Let me begin with the distribution of conservation benefits, which gets fought out in an arena labelled the "no losers" test. One of my Northwest economist colleagues has renamed it the "hardly any winners" test. This test constrains utility payments for energy savings to ensure that conservation

raises utilities rates no more than would equivalent quantities of generation. It is my position that, while seemingly neutral, this test is inherently discriminatory because conservation almost always raises utilities rates more than generating capacity of equal or even substantially higher cost, for the simple reason that utility sales are lower under the conservation alternative, so there are fewer kilowatt-hours over which to spread the system's fixed costs.

Compared to more expensive power plants then, conservation reduces bills but may raise rates. It is my view that, for most of us, bills are more important than rates.

To be fair to the other side, the justification for the test rests on equity grounds, noneconomic considerations. Proponents of the test argue that, absent this spending limit, those who do not participate in conservation programs will suffer; they would be better off if the utility increased its energy sales instead of buying conservation. The argument goes, why should nonparticipants' rates go up to subsidize other people's conservation? The phrase "other people's conservation" usually is delivered with a contemptuous tone, but you get the idea. That, in my view, is an argument for maximizing opportunities to participate in utility-funded conservation programs.

Few, if any, consumers cannot take advantage of substantially increased rewards for using less of the product. If incentives to install cost-effective conservation are substantial, and if marketing efforts focus on traditional nonparticipants, then utilities can buy energy savings without disadvantaging any class of customers. Those were the conclusions, and this is the policy of both California and the Pacific Northwest. Both regions have officially repudiated the "no losers" test. In the words of the Northwest Power Planning Council, one of whose representatives will be appearing before you next week, "Incentives should not be diluted simply to protect against rate impacts on those who choose not to respond."

What difference does all this make? On your system, apparently an immense difference. In studies released in March 1986, Ontario Hydro has prepared estimates of the amount of conservation available to its system with and without application of the "no losers" test, and the gap is, I think properly, very large. In Ontario Hydro's view, it makes about 2,000 megawatts of difference just in terms of retrofit potential on the existing sytem, and it makes an equivalent difference for new uses in terms of getting efficiency installed up front in new commercial and residential buildings.

The reason it makes such a difference is that in conservation, as everyplace else, how much you pay makes a difference in how much you can get. If you force consumers to bear a substantial cost of the conservation they are delivering to the system, you are not going to be able to persuade as many consumers to participate. Again, that is something we have extensive empirical experience on in the United States.

I submit that to talk about these conservation programs as subsidies misses the whole point. What you are doing here is buying electricity. You are buying it because it is less expensive than electricity from new generating resources. Talk of subsidy is meaningless. You do not give loans to people who build coal-fired and nuclear power plants for you, and you should not feel obliged to limit yourself to loans when you are trying to buy conservation-derived kilowatt-hours from your system.

I think the "no losers" test, though, is clearly a noneconomic, distributional issue that faces this committee and that has to be resolved in

the context of this kind of plan. If you choose to apply it, the amount of conservation you can get is going to be reduced significantly, and the energy costs to your entire system are going to increase significantly.

The second major set of noneconomic, social concerns is on the environmental side. There is some dispute about that. There are some who would argue that all the environmental costs that matter are captured in the cost of pollution control for the various alternatives that produce power on the system. I would vigorously dispute that, as I think would many who have studied the environmental consequences of generation of all kinds on the system.

The question is, what do you do about the additional environmental costs that are not captured in the cost of mitigation measures if you accept that those costs exist? The Congress took an interesting stab in the Pacific Northwest that you should be aware of when it told the Northwest, as part of the least-cost planning exercise I have described to you, that the Congress wanted quantifiable environmental costs and benefits to be made part of the cost comparison between conservation measures and the various generating resources. That is, the Congress wanted these various environmental impacts reduced to dollars and made part of the calculation.

I wish I could tell you that we made dramatic and significant progress there. In fact, the interesting thing that developed in the Northwest was that conservation emerged as the dominant choice for the system before the environmental calcuation even came into the picture. Since conservation made it possible to defer essentially all the new central station plants that had been planned for the region, we have not got into major battles over environmental costs and benefits, with two significant exceptions that are worth mentioning.

First, the Northwest has accepted, as a hard constraint on the hydro power system, measures to restore fish and wildlife losses that are attributable to the operation of the Northwest hydro system during the past 50 years. The Northwest is effectively sacrificing a substantial amount of electric power generation to rebuild fish and wildlife stocks. That is a significant decision in development that you can ask Roy Hemingway about when he appears next week.

The other emerging issue on environmental costs and benefits that is worth raising to this committee, because you will face it, involves indoor air quality. The issue is, how do you treat the costs associated with mechanical ventilation that are part of conservation packages for new houses--for example, in the US Pacific Northwest--to ensure high indoor air quality? This is a problem throughout Canada, and indeed the Canadians have been leaders on the technical side in finding mitigation solutions to the problem.

10:40 a.m.

One side of this debate argues that you have to treat these mechanical ventilation costs as part of the dollar cost of conserved kilowatt-hours in houses just as you include the cost of pollution control devices in the dollar cost per kilowatt-hour produced by power plants. It is a reasonable position, but let me offer the rejoinder that there is this difference: The conservation measures do not create the indoor air pollution, rather they create the occasion for confronting a public health problem that is independent of conservation and which we would otherwise ignore, even as we largely have been ignoring it, at least in the United States, over the past several decades.

High-efficiency houses with mechanical ventilation have better indoor air quality, on average, than low-efficiency houses without mechanical ventilation, because there is no assurance air will be moving through the low-efficiency houses, however leaky they are, at times when the outside air is not moving. As a consequence, the regular air changes associated with the high-efficiency houses are actually delivering a public health benefit that, in some views, would not be available if the conservation initiatives were not undertaken. Therefore, the ventilation costs that accompany conservation in new houses ought to be treated as quantifiable environmental benefits that at least offset the costs of putting in the ventilation.

If you accept that view, then you do not count the cost of mechanical ventilation against conservation in weighing its cost-effectiveness. You count it as a public health measure that ought to be taken whether or not you are doing conservation, because indoor air quality is a problem not uniquely associated with efficiency but rather with sources of pollution in existing houses that may or may not be efficient. Again, that is a battle that I think is as yet unresolved in the Northwest and California, but one of which every jurisdiction that is looking at conservation in houses has to be aware.

I said also I would say a word about what I characterized as the jobs issue. It is certainly true that in most of the jurisdictions of which I am aware where power plant construction remains an active prospect, one of the reasons for doing it is the job-related benefits it provides at the site and the indirect employment spawned from the site.

A useful new addition to the debate, which I would more or less table with the committee rather than adding my own views to it, is an exhaustive comparison of job-related benefits associated with conservation on the one hand and displaced power plants on the other.

In a survey, commissioned not by me nor by the Natural Resources Defense Council but by the Bonneville Power Administration, one of the major utilities in the north in the United States, and I think the one perhaps most closely analogous in operation and structure to Ontario Hydro, the conclusion, which again is cited and summarized in the report I have submitted to the committee, was that from a purely job creation, local economic stimulus standpoint, conservation had much to commend it over new electric generation, both in dispersion of jobs and avoidance of boom-town effects in terms of sustaining those jobs over an extended period, making them available to a broader cross-section of the population and preventing the siphoning of capital into what is, after all, one of the least job-intensive sectors of the economy according to this report, namely, new large central station power plants.

The interesting prospect that raises, which I will leave with you as a final thought on the social side, is that to the extent you are committed to an export policy--and Ontario Hydro has said it wants to sustain exports at a level of 1,000 average megawatts over at least the next decade; Manitoba is moving vigourously into exports, and so are British Columbia and the US Pacific Northwest--you do not have to think about an export-oriented policy solely in terms of new generating units. In effect, you can think of exporting conservation, using the dollars of the purchasing regions to upgrade and invigorate your own residential, commercial and industrial infrastructure and freeing up the exported kilowatt-hours through conservation as opposed to building new power plants.

Again, the BPA study suggests that, in the course of doing that, the local economy will reap a number of benefits that will not be reflected completely in the kind of cost-benefit analysis I have been describing.

Mr. Snell: I want to go back to your employment figure after you have finished that point.

Mr. Cavanagh: Sure.

Mr. Snell: In your report, you talked about conservation producing a large number of jobs, something like four times as many compared to nuclear, but those were onsite jobs, if I recall your term correctly. I think a legitimate argument from the point of view of the construction of large stations is that there are a large number of offsite construction jobs, such as preparing machinery and developing boilers. It is a legitimate claim that there is a very large economic benefit from those kinds of programs.

Mr. Cavanagh: That is a fair point and one that differentiates this province, which manufactures its own power plants, from, say, Manitoba, which has to import a lot of the necessary equipment and expertise.

On the other hand, all the technologies involved in constructing the conservation, if you will, ought also to be accessible to industry in Ontario. From the standpoint of technical sophistication, none of it is beyond the capacity of the industries of this province. Expanding the analysis, as Mr. Snell describes, should not be adverse to the prospects of conservation.

Mr. Snell: I wanted the committee to be aware that this is different from the United States, which might import a lot of the machinery and a lot of the aspects of--

Mr. Cavanagh: We make power plants there too.

Mr. Snell: But in the particular region that is doing the analysis. In Ontario, it is a little different.

Mr. Cavanagh: Fair point. Let me close, and then open for general questions, by looking ahead with you all towards the next two weeks and suggesting some questions and standards that you may want to apply as you have people who come forward to describe their ongoing resource-planning efforts, either from Ontario Hydro or from the various other groups which have alternatives to offer.

You would want to scrutinize any least-cost plan or any supply plan that comes before you by applying some of the following tests, which summarize much of what I was saying earlier.

First, is the forecast of system needs that you are being shown rooted in the actual end uses of electricity? If not, you are going to want to move immediately to commission the missing surveys. Get that information.

Second, you are going to want to know whether the resource plan that you are looking at draws on a thorough and up-to-date inventory of opportunities to improve efficiency in all major end-use categories. For example, an Ontario Hydro exhibit included in my briefing materials compares the savings that Ontario Hydro is now projecting with those that were included in the final power plan of the Northwest Power Planning Council. It says: "They are roughly comparable. We must be on the right track."

Questions are left unresolved by that superficial comparison. At the outset, there are substantial differences in climate between the two regions. Most of the Pacific Northwest lives in the extremely mild air, a 5,000 F degree-day area west of the Cascades. Ontario has a rather more severe experience in the winter. One would expect, therefore, the savings to be larger.

The conservation that is in the plan for the Pacific Northwest is what we needed to defer, essentially, all new, large, central station plants to put ourselves on a firm footing for the next 20 years. We did not need to do any more than that. You do only as much conservation as is worth doing, given your estimate of system needs. Taking someone else's exercise, where he went as far as he had to, and saying that is as far as you can go, is not something you should accept reflexively at the outset. The power council would be the first to say that.

You want to see if you have a thorough and up-to-date inventory of everything you could do to improve efficiency. Then you want to see--extremely important--whether the resource plan you are looking at includes a methodology for comparing the costs of conservation and generation that explicitly takes flexibility and uncertainty reduction into account. Are resources explicitly credited for advantages associated with scale, lead times, avoidance of additional reserve requirements, as I mentioned earlier, and reduced uncertainty about future loads? Do those values explicitly enter the cost-effectiveness process and, if so, how?

I urge you to look at whether the projections of achievable cost-effective conservation that the planner is telling you that he or she can get reflect the full array of regulatory and incentive options for which precedent already exists. Why and what difference does it make if some programs were omitted? Do those projections of conservation reflect an effort to take advantage of the best available experience with appliance standards, building standards and direct incentive programs in all end-use sectors and, if not, why not? Did the planners take the trouble to survey the full range of available precedent and to incorporate the results in the planning exercise?

You are entitled to ask that they incorporate the best of the results. I can find you badly designed conservation programs in the United States, but to rely on them to predict what you can do, now that you are in a position to take advantage of those mistakes, is, I submit, not appropriate.

10:50 a.m.

Finally, it is appropriate for you to ask anyone presenting a resource plan to you whether environmental considerations produced any changes in the plan, that is, to ask them, "How do your recommendations, based on your consideration of environmental value, differ from what your recommendations would have been based on considerations of dollar value alone?" That is a useful way for you at least to make explicit the tradeoffs that are being made between environmental and economic value.

At this point, I think it is best for me to hear your questions.

Mr. Ashe: You have made an excellent and clear presentation. The one area I would like you to expand on, if you will, are the words you used regularly, "utility-funded conservation efforts and programs." Based on the experience in the Northwest and the utilities you are familiar with, I would

like you to go into that in a little more detail. You used one example I know of of their actually hiring, training and paying some inspectors. Was that the general thing? The utility actually paid for it, then rolled that into their rate base because it was allowed? Were there grants to industry and to home owners? Were there loans and/or grants? Were there loans only where in effect they carried the financing of it?

Mr. Cavanagh: Actually, the answer is, all of the above. I will describe a couple of the programs. In Hood River, the utility paid the full cost, that is, the average house in Hood River had $4,200 worth of conservation installed in it, and the utility paid all of that and passed it through to ratepayers. Again, in the initial assessment, the cost per kilowatt-hour was substantially below the cost of avoided power from a new power station.

There are a number of variants on that. It is not always necessary to pay the whole cost to get the measure. For example, in the sphere of appliance efficiency, strictly from the standpoint of avoided cost of power, it would be worth it for some systems to buy people new refrigerators that were the most efficient available, just give the refrigerators to the home owners.

You generally do not need to go that far to get the level of response you need. The Northwest Power Planning Council, for example, took what seems to me a reasonable approach here. What they basically said the utilities should do was to try a phased approach: start with relatively modest incentives, and if you are not getting the participation rates you want in different sectors, be prepared to boost up those incentives, similar to an auction where you start low and move higher if you need to.

The one place where that is not appropriate, it seems to me, where at least I would make a strong argument on social grounds, is that if you want to ensure that low-income families can participate in these programs, you cannot use loans and partial grants. Low-income families--and, again, we have a very strong empirical base here in the United States--simply are not in a position to take advantage of loans and partial grants; they need the payments up front.

As to how the utility deals with the payments, there is a range of alternatives, but by and large the most appropriate treatment is the same as that of a power plant investment. The conservation is serving the same function as a power plant. The utility, if it is profit-making utility, should be able to earn a return. In Hydro's case, you should do with these investments, if you decide to make them, whatever you do with your existing power plant investment.

Some states go even further. Washington state, for example, allows utilities that invest in conservation to earn a higher return on the conservation than on a power plant. At this point, I think that is not appropriate. We know enough about doing conservation that there really is no need to offer a still greater reward. It seems to me that the rewards of uncertainty reduction and flexibility I have been discussing are reward enough.

Mr. Cureatz: You indicated a test in a community where you had 90 per cent participation?

Mr. Cavanagh: Ninety-one per cent.

Mr. Cureatz: What was the population of that community?

Mr. Cavanagh: There were 15,000 people and about 3,300 eligible houses.

Mr. Cureatz: Was it possible to put a cost estimate on the administration of putting through this test?

Mr. Cavanagh: Sure. The full budget of the program was about $20 million, of which about $12 million was spent on the measures themselves. The cost of the experiment, if you will, the extensive metering, the social science work, all reportings, was about $8 million. If I were this province, I would view that as basically a grant to the province. You should take advantage of these findings; you will not have to pay for them. Incidentally, all of them will be published in a series of reports that will be coming out over the next eight months.

Mr. Cureatz: The idea being, of course, with the money expended you would be able to calculate closely the savings in electrical production down the line?

Mr. Cavanagh: There were two issues. One was how much participation we could get. The second was how much savings we would get. The savings issue was still being resolved because basically we were trying to analyse a massive amount of data from the houses that were involved in the program. We know the participation rates now. The notion was that we would be able to generalize these results to the rest of the region, and one hopes to the rest of the country, and that it was worth spending a substantial amount on that first experiment in order to have those generalized results.

I am not suggesting that amount of administrative cost should be typical of these programs. You are not going to need to do that kind of exhaustive experimental work when, in effect, you are replicating what we already know how to do.

Mr. Cureatz: I have one other question, if Mr. Ashe does not mind. In looking at the data, can you reflect the experiment in terms of this kind of community across a larger based population, a small community of 15,000 in a city of five million?

Mr. Cavanagh: That was an important question for us in the Northwest because we have substantial cities there, too--Portland and Seattle--in addition to rural communities. We picked Hood River because the consensus was that this was the most difficult kind of community to get high participation. What we had were rural folks who were relatively suspicious of government programs and government giveaways. The community was viewed by the sociologists who did the initial survey as being an unusually tough nut. Part of the record on Hood River compiled for the Northwest Power Planning Council included the expert opinion of those involved that it ought to be easier to do this in cities.

The most important thing about Hood River is the extraordinary things which were learned about mobilizing community support and how important that is to making these programs work. You do not just go out with a media blitz, for example. You find out which are the significant interest groups and opinon leaders in the community. You enlist them up front. You have an advisory group of citizens from the neighbourhood, if you are in a city; if you are in a rural area, you have them from the county or community and you have them playing an active role in designing and implementing the program.

The mistakes we made, the successes we had should be things you can learn from, things that can be learned from any system that is prepared to put high priority on trying to widely distribute the benefits of these programs. That was the reason for doing it.

Mr. Cureatz: Mrs. Grier, that would go to your point last week in regard to the kinds of problems Ontario Hydro often encounters in trying to get its programs across, seeking advice from the communities. It would be interesting so far as that presentation by Hydro is concerned, as opposed to what has been suggested about what it has been doing.

Mrs. Grier: This applied to domestic users. It was not commercial.

Mr. Cavanagh: Yes. The particular project is focused solely at residential. There are other experiments now moving forward on the commercial side. In that regard you might want to request from the sponsors the sociologists' report that they had commissioned on the Hood River community, which is a useful model on how to start that kind of community outreach.

Mr. Cureatz: Yes, that would be worth while.

Mr. Chairman: Were you are attempting to alter the social habits of that community?

Mr. Cavanagh: No.

Mr. Chairman: It was a more direct intervention to create energy-efficient housing.

Mr. Cavanagh: Yes. We were trying to improve the efficiency of the houses. We were not trying to alter the living patterns of the occupants.

Mr. Chairman: Thank you. Mr. Ashe, we are still with you.

Mr. Ashe: It is all right, Mr. Chairman. I will pass for the moment.

Mr. Haggerty: To follow on Mr. Ashe's question, you said grants were given by the industry to subsidize insulation in homes. Was this grant originally from any government agency?

Mr. Cavanagh: No. These were funds taken from the ratepayers. The ratepayers pay for power plants. It is the perspective of least-cost planners that the ratepayers should pay for the conservation that displaces the power plants. Government funds were not used to invest directly in conservation either in Hood River or in any of the projects I have been describing. The government role comes in on the standards side where there has been extensive government involvement in regulating the efficiency of new buildings and new appliances in both California and the Pacific Northwest.

The funding base has shifted to the utilities on the theory, again, that it is not a subsidy. It is a purchase of cost-effective electricity and as such it is appropriate for the expenditure of ratepayer dollars as opposed to general taxpayer dollars.

Mr. Haggerty: Would utility rates not go higher if it were done this way? What is the advantage in conservation if you are going to have higher utility rates?

Mr. Cavanagh: The advantage in conservation is that you are avoiding still more expensive power plants so that the overall electric bill of the system is lower with the conservation, even after the conservation has been put into the rate base, than it would have been if you had to buy more expensive power plants instead. The reason to do this is to lower your provincial electric bill.

Again, what matters, the bill or the rates? Most people I know look at the bill, the bottom line, how much they have to pay. You are doing this to minimize your provincial electric bill, to have more money available to do other things on the theory that very few people in this province have any yearning for electricity in and of itself. What they want is the services it can provide. If you can provide those services for less electricity at less cost, you ought to do it, even if there is some upward pressure on rates as a consequence. Let us not disguise that. Obviously there is upward pressure on rates because you have to pay for this. If you believe the ratepayer should do it, it is going to show up in the rates.

11 a.m.

Mr. Polsinelli: Mr. Cavanagh, I am interested in your perception of the government role in all this. Even though it is a crown corporation, Ontario Hydro has historically operated at arm's length from government. If we are going to entertain a regulatory and incentive program to make the conservation supply option work, do we have to hamper this arm's-length relationship and should government perhaps take a more active role in determining the options?

Mr. Cavanagh: Let me respond generally to that. It would be presumptuous of me to make a detailed recommendation without knowing more about the institutional relationships, but I think I can say this much: Clearly there has to be a partnership between the regulator and the utility. You have to work hand in hand. You are moving towards a common end. Your regulatory measures should be co-ordinated with the utility's incentive payments. If you are operating at cross-purposes and the left hand does not know what the right is doing, you have the worst of all worlds in which one group of entities is doing things that tend to reduce the need for power plants even as another group of entities is building power plants. If you choose this route, somehow you have to find a way to co-ordinate with Hydro.

As to how precisely you want to do that, in the Northwest Power Planning Council case, an independent planning entity was created that developed a resource plan which the utility was then told to act with consistently. In California, the regulatory body was given direct authority to adopt efficiency standards and simultaneously was given authority to approve any power plant construction by the utility.

There are a number of institutional variants you can draw on in the United States, but the common theme is that without effective co-ordination this is not going to work very well. Obviously, regulatory and incentive work have to be done by different institutions. The utility cannot regulate and you should not be paying for these resources that--

Mr. Polsinelli: How does the independent planning entity work? Does it have representation from both the hydro commission and the government end of it?

Mr. Cavanagh: Mercifully, you are spared the boundary problems that exist throughout the United States where the electrical energy planning

regions are bigger than the states, which creates all kinds of problems. Provinces do not have that problem. With the Northwest Power Planning Council, the governors of the four states appoint two representatives each to this independent regulatory body. There is no representation for the utility any more than there is representation for any of the other advocates in the process. This planning body is supposed to look at needs for the next 20 years, develop a least-cost plan and then, at least in theory, the utility acts consistently with the plan.

In practice, all kinds of problems have emerged with that model. There are problems institutionally in putting together the legislation, which reflects the intense sovereign feelings of the American states. The utility in this case, the Bonneville Power Administration, in its view is not compelled in all respects to act consistently with the plan, and all kinds of frictions have emerged. The council has tried to press Bonneville to do more and Bonneville has resisted. In principle, however, the general direction the council has sketched is one that Bonneville accepts.

Bonneville is now investing more than $100 million in conservation. The last time I looked I think Hydro had invested a total of $17 million in more than five years. It is beginning to work. A tighter level of co-ordination is appropriate. I would bring this up with Roy Hemingway in particular, the extent to which he feels his experience would transfer to Ontario or whether he thinks a tighter level of control by the planning body is appropriate. The energy commission in California has the best of all worlds because it has direct standard-setting authority.

Mr. Polsinelli: Is that a regulatory authority in California?

Mr. Cavanagh: Yes.

Mr. Polsinelli: They can actually make regulations.

Mr. Cavanagh: They can impose appliance efficiency standards and they have done it. They can impose building standards and they have done it. They can then introduce those standards directly into their plants.

The other problem the power council has is that it cannot impose efficiency standards on the four states. The four states have to adopt them voluntarily, and the power council has had all kinds of difficulty getting them to do that. This is a problem you do not have to have here in Ontario because you are not dealing with four proud and independent, separate states. Presumably, you are in a position to represent the political interests and views of the populace as a whole and will be able to make regulatory decisions if you deem them appropriate.

That is something to which I think Roy Hemingway can speak eloquently. He is the veteran of many a legislative hearing in Oregon, Washington, Idaho and Montana, trying to get recalcitrant states to change their building codes over the outraged objections of the local building industry.

Mr. Ashe: That sounds familiar.

Mr. Cavanagh: Yes, I imagine it does.

Incidentally, it is terribly important, and we have learned this painfully in the Northwest now, that there are things that can be done on the utility's side to reduce the concerns that constituencies such as the builders

are going to have. The builders' view of a new code tends to change a lot if they know the extra cost of building the houses in the initial years will be recompensed by the utility. That is something the Northwest chose not to do in the first iteration. Understandably, the builders went berserk. In the second iteration, the Northwest is now bringing in substantial incentives to try to reduce that level of opposition. I think it will be successful.

Mrs. Grier: Have there been examples of the utilities themselves initiating the kind of least-cost options or analysis you have talked about?

Mr. Cavanagh: That is a good point, because an obvious question is, does this have to be imposed or is this something utilities can learn for themselves? Again, the record is mixed.

The obvious precedent for a utility that learned how to do this by itself is the Tennessee Valley Authority in the United States. Many of us regret it did not learn it sooner, because by the time the TVA had learned to do least-cost planning, it had 17 nuclear units under construction, eight of which it subsequently had to abandon. At TVA, as far as I know, the pressure to do this was internally generated.

Elsewhere, it has been externally generated. In both California and the Northwest, I think it is fair to say the initial impetus came from forces in government as opposed to forces in the utilities sector. However, it is important for me to emphasize that the utilities were not dragged along kicking and screaming. After they took a hard look at these methods and the kinds of contentions I have been making to you, by and large I think they have agreed that this is worth doing.

If you brought before you Peter Johnson, the administrator of the Bonneville Power Administration, or the chief executive officer of the Pacific Gas and Electric Co. or of the Southern California Edison Co., I think he would basically tell you: "We are glad you are doing this. We are committed to it."

Just in 1984, the California "invest in your own utilities" program spent US$380 million on direct investment in conservation. We have institutionalized this now in many parts of the country. We do not have to be talking about it as a kind of pilot exercise or experiment. Again, remember these investments I am describing have basically replaced central station generation in the resource plans of the regions, California and the Northwest, that I have been discussing with you today.

Mr. Chairman: Are you finished, Mrs. Grier?

Mrs. Grier: Yes, thank you.

Mr. Chairman: Are there question from other members of the committee?

Mr. Snell: You talk about a substantial transition and large investments in conservation. What kind of implications have those had on the utility and the way it organizes? If there is a much greater focus on what you might call energy services or end use or customer relations, what has that done for internal organization and how the utility approaches the marketplace?

Mr. Cavanagh: That is a crucial point. When we began doing this eight years ago, the utilities involved were basically construction companies. Historically, they had functioned as entities whose philosophy was "build and

grow," and their internal advancement policy and personnel, by and large, were people who knew how to build. That is what they were organized to do. What we are talking about here involves a very different function and it has meant some significant changes in the organization of utilities.

For example, look at the Bonneville Power Administration. When conservation got started at Bonneville, it was a tiny pilot outfit with a few staff members buried deep in the power management division, which was composed of engineers who built transmission lines and supervised the construction of power plants. What had to happen to make conservation an equal partner with generation in the utility's planning process was for conservation to become an independent division of the utility, fully staffed, with the same direct access to the chief executive officer and resources that were appropriate to the importance of the mission.

At present, of the resources Bonneville is acquiring over the next five years, conservation is dominant. The new generation is substantially more significant, both in megawatts and dollars. Staffing and internal organization reflect that. But if you are looking at Ontario Hydro, whose total investment in conservation in recent years I believe has been on the $3-million-a-year level as opposed to the $100-million-plus level--and I am sure Hydro would the first to acknowledge this--there clearly are going to have to be some institutional adjustments to equip it to handle this kind of thing if you decide it is appropriate for Hydro to do it.

11:10 a.m.

Mr. Chairman: You may have answered this question earlier, but I am not sure I was totally clear on the answer. It is the old chestnut of whether the utility is the proper vehicle to implement strategic conservation.

Mr. Cavanagh: Let me spend a moment on that, because an obvious question in all of this--and I am sure you are going to get it in the course of these hearings during the next couple of weeks--is why do utilities have to intervene in conservation at all? If there is so much conservation out there that is worth doing, if the Amory Lovinses of the world are right, then all this stuff that is going to happen as a result of consumer choice and why on earth do we as utilities have to play a role in it?

My answer to that, and the answer that has been persuasive in the jurisdictions we have been discussing today, is that there are a number of reasons the market does not work effectively or efficiently on the conservation side; a number of barriers or market obstacles to the realization of these conservation benefits that tend to be very persuasive to classic free market economists, who are normally reluctant to see anyone intervene in the free commerce of individual transactions.

The most significant of those barriers is what I have described in the paper I have submitted to the committee as a payback gap between utilities and customers that works something like this.

If any of you are called upon to make a choice about how much conservation to buy, whether it is in an appliance or in your business, you collectively--this is based on empirical experience in the United States and Canada--tend to insist on getting your money back in reduced energy bills within six months to two years. In other words, you demand a very high return on your conservation investment, on the order of 30 per cent to 200 per cent empirically.

On the other hand, utilities, which are making investment decisions on the supply side, obviously are not requiring that the power plants in which they invest earn anything like that kind of return, particularly in the case of a nuclear reactor that will not even begin producing power for 14 years.

You have a very different kind of investment perspective being brought to bear when you will elect that on the supply side but you will not elect something on the demand side with, say, a three-year payback. It is the effort to merge those investment perspectives that in part is the reason for bringing utilities over to the conservation side. If you do not bring utilities over to the conservation side, you are going to continue to have this enormous disparity in investment perspective between conservation and power plants.

There are a number of other obstacles to the maximizing of cost-effectiveness on the conservation side. Just briefly, here are a couple. It turns out that a majority of large energy-consuming applicances are not bought by the people who are ultimately going to be paying the electric bills; they are bought by third parties. By the same token, many people are not going to be staying in housing that they are renting or own only temporarily to justify, in their view, investments that have a long payback beyond the time they plan to be in the structure.

All those obstacles together conspire to create a situation in which, if you look at the average efficiencies on the system and the best efficiencies that are cost justified, in every electric system in North America you find an enormous gap precisely because these obstacles are quite robust and substantial. The utility intervenes to break the obstacles down, and the reason the utility is doing that is to minimize the system cost. It is not being done altruistically. It is not being done as kind of a grand social plan on the utility's part. It can be justified, and it is justified in the Northwest and California, purely on cost grounds.

Again, the pace at which it is done is something you are going to set by reference to how much you need to do. I noticed in the committee's report on Darlington a reference to the fact that, while California was becoming more efficient in reducing its electricity intensiveness, the pace of improvement did not seem to be as rapid as the advocates of conservation would suggest, given the large conservation opportunities they suggested were out there.

Again, though, you do not go faster than you have to, and in Calfornia, which has basically deferred or cancelled all its new large central station units and is in the process of backing off its oil and gas, there has not been a necessity to go faster than we are going now. But you do not even know how quickly you need to go or how far you are in a position to go until you have undertaken the kind of analysis I have described to you today. If you have not undertaken it, then the sobering side of this whole debate is that you are opening yourselves to enormous risks that so far have not come to roost in Canada nearly to the extent that they have in the US but which should not be dismissed out of hand by anyone with an appreciation of recent history.

Mrs. Grier: Given the capacity we have in Ontario and given that the investment has already been made in nuclear plants, where is the incentive?

Mr. Cavanagh: Another way of posing that is, what are you in a position to displace? One of the things you have to decide in this analysis is, "What are we measuring conservation against?" You have several choices. You have some nuclear reactors still under construction. You can choose to treat those as sacrosanct or, as has increasingly been done in the US, you can

at least take a hard look at those units that are least far advanced in construction as possible candidates for being avoided. That sets an immediate rationale for doing this.

You may make a decision that those plants are committed to construction and there is no way they can be slowed or put in suspension while a decision is made. Just parenthetically, we have learned a lot in the US about putting power plants in suspension while decisions are made. That experience might actually be useful to you if you ever get to the point of taking a serious look at slowing construction on Darlington units 3 and 4.

If you put that aside, are there still reasons for doing this? I would say yes. First, the Ontario Hydro forecasts continue to show both the huge uncertainty that I referred to a moment ago and a need for acquisition of new resources in the latter part of the 1990s. If you limited yourselves solely to long lead-time options, you would have to make decisions about those instantly. With this type of planning, you can begin to bankroll some alternatives.

With this planning, you can also begin to focus on what are called lost-opportunity conservation resources. Your new houses and commercial floor space in this province will be around for 50 to 100 years on average, far beyond the duration of any temporary surplus of power. It is a lot cheaper to get conservation up front, to get the things built right in the first place, than to try to go in later to fix low-efficiency systems. In many cases, those lost opportunities provide a rationale for moving swiftly in at least some sectors for conservation.

Finally, you may want to take a hard look, in at least some of the conservation alternatives, at the possibilities of moving some of the more expensive fossil-fuel units off your system more rapidly than you otherwise would. Conservation offers you a way to do that.

I said "finally," but there is one other consideration which I briefly mentioned earlier; that is, the possible relationship of conservation investment and export revenue. Again, Ontario Hydro would like to be able to sell firm power to US consuming utilities, and given what has happened to oil prices in the past weeks, firm power looks to be the only way to get substantial revenue out of American purchasers.

If you want to do that, you have to be in a position to assure yourself that surpluses will be available. You have enormous uncertainty in your existing forecasts. You can reduce that uncertainty and increase your export revenue with a better product by again investing in conservation there with an eye towards export markets. Manitoba is looking at doing that now, as is the US Pacific Northwest. Stop thinking about export policies solely in terms of power plants, and you begin to develop still another justification for pressing ahead with this.

You are correct in identifying a key issue, which is, what are we avoiding? You can be avoiding many different things, and depending on what you are avoiding, the value you assign to conservation will change. That will be a critical decision that presumably this committee will have to make.

Mr. Snell: How do you deal explicitly with these advantages you talked about today; a lack of transmission lines, rush reserve requirement, etc.? How specifically do you account for that or give that value in the planning process?

Mr. Cavanagh: I have attempted a fuller answer to that question in the paper I have submitted to the committee, but let me try to summarize a response.

Some of the things are easy to handle explicitly. Conservation avoids transmission construction costs, land losses associated with those new transmission lines and additional system reserves. You can apply all that as a specific credit based on the cost of what is being avoided.

The more difficult things to take into consideration are the uncertainty reduction and the increased flexibility. In the paper, I have suggested that a way of doing that explicitly is to assign the conservation. When you do the cost-effective analysis, one of the issues is the cost of money that you have to impute to the construction expenditure for the alternative. Whether it is a power plant or a conservation investment, money does not come free.

11:20 a.m.

I have suggested imputing a lower cost of money to the conservation on the theory that it is a lower-risk investment. If you look out there in the marketplace, you can find different returns assigned by the market to investments with different levels of risk. Investments in common stock have one level of return that is substantially higher than investments in government bonds, for example. I have suggested using that disparity as a benchmark for evaluating the relative risk advantages of conservation versus power plants, and that is one way of injecting explicitly into the cost-effectiveness comparison the advantages I have been talking about. There are others.

I think what is of primary importance is that it be done and that it be done by reference to some kind of objective indices, so that it is not just the whim of the analyst. That is why I have reference to market indices of the return earned by investments at different levels of risk. It gives me an objective indicator that, it seems to me, is directly relevant to what we are trying to measure here. After all, what am I trying to do? I am trying to give you a more balanced, lower-risk portfolio of supply investment. It seems to me appropriate to look to the marketplace in trying to assign a cost and a value to what I am doing.

Mr. Snell: Bringing back a comment you made earlier, you said there is less risk with conservation, yet the marketplace demands a shorter payback period; so it is penalized rather than what you are suggesting, which would be some kind of accounting in the planning process for the actual lower risk that it has.

Mr. Cavanagh: The planning process I am talking about is your effort, remember, as planners to override market barriers and to make the system work, as it must, to maximize benefit to society. What actually happens out there in the marketplace is that conservation gets crucified by a large number of market barriers, not to the point where it does not emerge and where exciting innovation does not occur, because we have seen both--conservation keeps busting out all over, notwithstanding these obstacles--but conservation cannot be converted into a reliable resource for utilities without, I submit, the kind of intervention I am talking about.

What I am saying is that, in doing the analysis of how much of that intervention is worth while, you as the utility take account of the benefits

that actually are associated with conservation when you look at it objectively, but which the market today, for the reasons I have discussed, does not recognize.

Sure, there is the following paradox. The market out there today is acting as if conservation were a relatively less desirable investment than power plants, even as we can see on every objective index that the reverse is true. I am suggesting that this is not because people are crazy or because there is a rationality rife in society in North America, but because there are understandable, specific market barriers operating that we have to break down if we are going to maximize benefit to any utility system.

Mr. Snell: Let us say the committee decided that conservation were good for society as a whole. How far do you go with respect to the freedom-of-choice issue? How is that resolved in jurisdictions you have been involved with?

Mr. Cavanagh: In general, the image of the thermostat police, the brown-shirted heavies kicking down the door to make sure you are at 62 degrees, is one all of us resist. That really is not what I have been talking about when I discuss, for example, regulatory measures; I am talking about incremental adjustments in regulation that I think most North Americans are comfortable with. Most jurisdictions have some experience with building codes. Often the experience is terrible, but at least building codes are something that I think most Canadians and Americans do not shrink from with aversion and do not associate with the thermostat police image. Ditto for appliance standards.

What we are doing here is talking about regulation that delivers equivalent service at lower electricity consumption. You can still buy. It is important that the 18-cubic-foot, frost-free upright refrigerator be in department stores. I submit that is what the consumer cares about, not whether there are wasteful ones available in addition to efficient ones. Most consumers, I know, again, have no yearning for kilowatt-hours per se. No one plugs into the electrical outlet for recreational purposes. The goal is to get the service. What these regulations that I am talking about do is offer you equivalent service at lower electricity consumption. They are a way to break down the barriers that are otherwise very effective, that prevent manufacturers from installing all the efficiency that is cost-effective to the electric system.

After all, given the market climate I have just described, if any of you wants to buy a refrigerator, it is usually because yours is broken down, you want one fast, and what you tend to focus on is the purchase price. If you are straitened economically, you are going to go for the cheapest unit. That is not the marketplace dynamic calculated to get maximum life-cycle savings out of refrigerators. The decision to let that situation persist is a decision that imposes immense cost on society in the form of unnecessary power plants. What the efficiency incentives do is get the guzzlers off the market.

If you are concerned about the costs of those regulations in terms of the extra first cost the devices that consume electricity will have as a consequence of the regulation, then you can begin to intervene selectively with incentives, as I have described. You can talk about the utility paying to offset the increased first cost if you think that is an overriding problem. Some jurisdictions do not. California decided the extra cost of houses under its high-efficiency new standards would be paid off relatively quickly by

reduced utility bills and there was no reason to worry about paying incentives. You may reach the same conclusion. It is a policy call. However, you are in a position to address those problems if you want to. Again, none of the regulations I am talking about involves the kind of interference with consumer choice that would really raise all our hackles, living in free societies.

Mr. Chairman: Mr. Cavanagh, do you represent a national organization?

Mr. Cavanagh: Yes, national, United States.

Mr. Chairman: One of our principal problems is that we have jurisdictional variations depending on where you go. You mentioned that Manitoba does not make power plants, whereas in Ontario many of the components of a power plant are manufactured in the province. That has a spillover of jobs off the actual site where the project is constructed. There are building codes and probably a number of other things.

One of the questions I would like to ask you is really for an opinion. From the national perspective, which your organization deals with, how do you deal with the jurisdictional variations that we have in this country and you have in the United States? From our standpoint as a committee, how do we deal with specific jurisdictional criteria?

Mr. Cavanagh: You cannot address electrical energy planning issues from a national perspective. I learned that about the second month I went to work at the Natural Resources Defense Council. Therefore, of necessity and ever since, I have adopted a regional perspective in all the work I do. For example, I do not talk about the western United States when I am discussing what has been done. I talk about California as one integrated region and the Pacific Northwest as another. It seems to me it would be fair to talk about Ontario as still another.

You are identifying one of the things that the whole exercise you are embarked upon needs to do, which I am not in a position to do for you today although I would be glad to help you look at it. Precisely one of the challenges that faces you is how to co-ordinate a number of regulatory and investment authorities that are now operating in a more or less completely unco-ordinated fashion at great cost to the province. Other challenges you have are how to get building codes working in synchrony with utility investment and how to get appliance manufacturers making designs that make sense from the standpoint of overall system needs 20 years from now in Ontario. These are questions nobody has asked before.

Mr. Chairman: They are also questions that have a much broader scale outside Ontario.

Mr. Cavanagh: Certainly they do. Although it should be said--and this is the encouraging point--most of what you need to do does not require, for example, the intervention of the federal government of the nation. The US Northwest and Canada have received virtually no aid and comfort, nor asked for them, from the United States federal government. The integrated system is, after all, one traditionally under state control, even as the provincial utilities, as I understand it, are traditionally creatures of the provincial governments in this country and not of the national government.

It is fair to say of Canada, as well as the United States, that historically there has been a fair amount of rhetoric from time to time over the years, but not a level of involvement in electric utility policy and planning that is in any way comparable to what either the regional utilities have done or what you as provincial governments have done. You can draw some comfort from that. You are the right people to be looking at these issues. That is not in any way to minimize the challenge you face. However, based on my experience, it is not as if everything you do is contingent on support and intervention at the national level in order to succeed. You can succeed here with your own resources and your own institutions. That is the lesson I draw from the Northwest and from California.

11:30 a.m.

Mr. Charlton: There are two things I take out of what is being said here and the question that was asked. It is fair to say that in Ontario we very consciously developed a nuclear industry to go along with the construction of nuclear generation facilities. It is also true, though, that we happen to be the manufacturing heartland of this country. In southern Ontario, we produce refrigerators, stoves, fans, toasters, irons and everything else that plugs into the wall. Although we have imported appliances, there is nothing in the appliance sector we do not produce somewhere in Ontario.

The setting of regulations for standards for energy efficiency ultimately will have the same kind of policy impact on Ontario's efficiency or conservation manufacturing as what we consciously did with building a nuclear industry. That can provide advantages to Ontario's manufacturing sector that do not exist now.

Mr. Cavanagh: I would also say you may be on the verge of a decision as important as the original one to build the nuclear industry, that is, whether you want Ontario to lead Canada in building a conservation industry. The nuclear decision at the time is not one I would reopen. It produced a substantial inventory of low operating cost units on your system. However, today, there are some unique, structural disadvantages to continuing with that industry in terms of the scale of what it produces.

Conceding all the engineering expertise in Canada today that has made its nuclear experience in many respects different from that of the United States, the time still may be right--I am urging that the time is right--for you to make a decision of comparable magnitude. One would hope it would have comparable economic impact with regard to a new industry that is better fitted to the electrical energy needs of the system, one that you are certainly equipped to carry, even as you carry the nuclear industry, given the infrastructure of this province. If you take into account the export considerations I suggested earlier, you may even be able to get the Americans to pay for some of it, which is a possibility not without value. I endorse that point of view. It has driven some of the policy considerations in the United States.

Mr. Ashe: I will be brief. You are familiar with the rate structures in the Northwest and California. Have you had an opportunity to become somewhat familiar with Ontario Hydro's rate structure and general residential rates?

Mr. Cavanagh: No, I have not. Do you still have declining blocks?

Mr. Ashe: Yes.

Mr. Cavanagh: That says a great deal.

Mr. Ashe: What is the relative comparison we are starting at right now? For example, it is my understanding that there are few, if any, utility-serviced areas in the United States that have lower rates than Quebec and Manitoba, followed by Ontario. It is pretty well in that order. I am trying to get a feel for the differential in the area you are working in or familiar with compared to Ontario.

Mr. Cavanagh: I think the only region in the United States that is comparable to Ontario is sections of the US Northwest, where you can find retail rates as low as one and a half to two cents US for a kilowatt hour. I think this is comparable to or maybe even a little lower than what you average in Ontario.

There is an interesting feature of the Northwest experience that may also be applicable here. The Northwest has decided that its unique advantage in terms of international economic competition is precisely the fact that it has a relatively large inventory of relatively inexpensive generating resources, dominated by a cheap hydro base in the Northwest that is a little larger than yours, but it is similar. You also have the large existing Candu base.

The Northwest perception is that it is crucial to sustain that economic advantage, that the system should avoid as long as possible any additions of new large central station units, because those new large central station units would create substantial upward pressure on rates--there is no way of avoiding it--and that it is worth making a major effort to upgrade efficiencies through direct intervention by the utility without waiting for prices to do it.

As a way of providing an inducement to greater efficiency, one of the things the Northwest could have done was to let the rates run up with the addition of new power plants. Over a decade or so, that might well have shocked the system into substantial reductions in use, but at great cost. Part of the effort in the Northwest is to avoid that.

Mr. Ashe: Do all the utilities in the Northwest operate on the block-rate philosophy?

Mr. Cavanagh: The utilities in the Northwest vary substantially. There are more than 100 of them. Some still have declining block rates. I would say the majority of customers in the northwest now are served by flat or inverted-rate utilities. The same is true, incidentally, of California. It is certainly the case that incentives to waste the product, or to use it profitably--that perhaps is a more gentle way of saying that--are not as prevalent in the Northwest and California as they were five years ago.

Mr. Ashe: Is that the same for the commercial industrial sector?

Mr. Cavanagh: The commercial industrial sectors tend to be flat, not inverted. We have not found an effective way to invert commercial and industrial rates, given the enormous variations in use patterns.

Mr. Ashe: When you say they are level, does that mean a heavy electricity-use industry pays the same rate as the little manufacturing firm

that uses a piddling amount of electricity? You will scare those heavy uses away.

Mr. Cavanagh: No. The very heavy uses that we have in the Northwest are the heaviest uses in the North American continent. We have 10 aluminum plants which use 20 per cent of the region's electricity. They get a special break, and that will not surprise any Canadian. That sort of thing is going on all over North America.

Mr. Ashe: I have no problem with that. I just presumed it. Some who come before us suggest that there are no breaks, that everything is a deterrent to use a lot of electricity regardless of why. I just wanted to clarify that. Thank you.

Mr. Brandt: I wanted to pursue the question of the differential in the time frame between constructing power in Ontario as opposed to the United States. From your figures, there appears to be a one-third longer time frame necessary to bring power on stream. Can you give us some of the factors involved in that?

Mr. Cavanagh: It might be true for nuclear. The briefing material supplied to me suggested that your typical figures are 10 to 11 years for large-scale hydraulic and coal and 14 years for nuclear. The United States experience would be comparable for coal and hydraulic and probably significantly longer for nuclear. However, we are talking about shades of difference which, once you get over a decade, may not be all that significant.

The power council's view was that anything over a decade was simply too long in terms of the system's ability to predict confidently and that there was a great premium on reducing lead times and on finding resources that could be on line in one to three years as opposed to 10 to 16 years.

There is no question that the American experience on nuclear has been more adventurous than the Canadian experience. In the past 12 years, there have been some 115 cancellations of nuclear reactors in the United States at a total cost in excess of $20 billion. You have not confronted anything such as that. There is a vigorous debate in terms of the consequences that I would not presume to try to resolve here. The disparities are not critical for purposes of what I have been discussing here, where the dominant point is that we have to do better than something that takes 10 years to build and something that comes on line in a package of 900 megawatts. The Candus are getting bigger.

The Darlington station, as I recall, is now at about 880 megawatts. There are proposals to get a new generation in at more than 1,000 megawatts. You are talking about packages of power and durations of construction that are just indigestible lumps from the standpoint of those gaping jaws in the forecasts I described. You want to be lighter on your feet than that type of machine allows you to be.

Mr. Brandt: You use the term "indigestible lumps." Can that be quantified with respect to the cost differential, at least on the nuclear side? You mentioned coal was reasonably equal with respect to time frames involved, but it is not on the nuclear side. Have you been able to quantify a cost differential?

Mr. Cavanagh: You can quantify the economic value of the difference in scale between conservation and nuclear by looking to the market, what

returns the market demands for investments at different levels of risk. I would treat the indigestibility I have described to you as comparable to a high-risk investment in the market, such as stocks. I would treat the flexibility small-scale advantages that I have described as comparable to the lower-risk advantages of government bonds. I would use the disparity in return that the market creates in that situation as one way to assign different costs to the different resources.

Between coal and nuclear, there is much less to choose from because, again, you are over a threshold. You are talking about 11 years versus 14 years in Canada. In the United States, you are probably talking about 10 years versus 16 or 17 years. It is bigger.

11:40 a.m.

Both the options are priced out of the market of flexibility by comparison either to the conservation I have been discussing or some of the independent power production technologies that, in particular, are bursting all over in California.

I should note that as of April 1985 California had applications for 21,000 megawatts of independent power production from 1,500 suppliers on file. That was with scales and lead times greater than the conservation but still far below the large central station units. The generating technologies are in a process of very rapid transition now that is comparable to what is going on on the conservation side, and they clearly need to be taken into account as you look at your large base load options during the next few decades. It is precisely that burst of innovation on the generation as well as the conservation side that makes me want to hedge my bets if I am looking at a utility system. It makes me reluctant to do what some American utility executives refer to as "betting the company" on that indigestible lump that may or may not still be a relevant technology after the turn of the century.

Mr. Charlton: On the lead time question, I think it is fair to say--and we should clearly understand this--that the figures of 10 or 11 years for hydraulic and coal and 14 or 15 years for nuclear in Ontario, although they may be accurate in past experience, are extremely misleading. All of the Hydro officials, on the basis of their experience in the present southwestern corridor transmission hearings, will agree that none of the major hydro facilities in this province have been subject to legislation that we passed in the last decade, and this hearing and approval process will substantially increase the lead time of all three of those major kinds of facilities.

Mr. Brandt: May I also pursue the question of the mothballing of the nuclear plants in particular? This may be a question of opinion on your part rather than of hard fact, but I would appreciate your opinion, if that is what it is. Has the coal lobby been a factor in that mothballing?

As an example, Mr. Charlton and I spent some time in Illinois a couple of years ago and while we were there we were rather astounded by the very vociferous and very aggressive position being taken by the coal lobby. It is the whole option of environment versus jobs as far as they are concerned, because coal is obviously the dirtier burning fuel of the two. From our perspective in Canada, many of us--perhaps not all, but many of us--might opt for the nuclear option in the US rather than the sulphur dioxide emissions that are constantly spewing out of the northeastern US in particular.

Mr. Cavanagh: The Midwest does pretty well, too.

Mr. Brandt: Can you give me your opinion, at least, on what kind of factor they have been with respect to this whole nuclear question?

Mr. Cavanagh: Sure. In the Northwest, which is where we have learned the most about preserving nuclear plants in hopes of a clearer set of information on what to do with them, the coal lobby has been irrelevant for the following reason. When we started the Northwest planning exercise in 1980, everyone thought it was going to be an issue of coal versus nuclear and the question would be which would capture the greater share of the Northwest's enormous needs for new power. We ended up discovering, after engaging in the exercise I have just described to you today, that this was not the issue, that both coal and nuclear decisively failed the competition with smaller-scale alternatives. Coal disappeared from the Northwest's planning charts just as nuclear did. The decision to mothball and to put into preservation mode Washington Public Power Supply System units 1 and 3, which is the precedent that I referred to, was in no way a decision to replace them with coal. It was, in effect, a decision to replace them with conservation.

I believe, and there is now an increasing body of literature on this in the US, that the most effective acid rain control strategy for the US, an issue of obvious concern to Canada, is not the construction of additional nuclear plants to back out coal but the use of the alternatives I have been describing today to back out coal. That is, I do not accept for a moment--and again, the Northwest and California planning exercises are the best evidence I can give--that the choice is between coal and nuclear.

That is like asking me for the best choice in the spoiled produce section in my supermarket. There is some perfectly good produce over in the other bin and I would go there first. That bin is full; in fact, it is overfull. As it looks at its conservation and independent power production alternatives, California is complaining about an embarrassment of options and the question of a new coal-nuclear plant does not enter the picture.

I think it is fair to say at this point, and any expert from either region would agree, that new coal and new nuclear are obsolete technologies in the regions I have been describing to you. They are not in prospect at any time in the foreseeable future.

This answer is too long-winded. It was not the coal lobby. I think it was a very sober-minded decision taken by the administrator of the Bonneville Power Administration, who is a very conventional, hard-headed businessman who looks at the bottom line, and his judgement was that he did not want to continue spending money on these plants until he had completed a thorough assessment of whether he needed to finish them. Once he suspended construction and stopped the haemorrhaging of dollars, he determined he could hold them in suspended animation for a period of years, maintain all their licences and retain the option of resuming construction.

The point I would make to this committee, in considering that experience and look at some analogous possibilities here, is that at the time those decisions to mothball were made there were the same outraged howls that I am sure you have heard from everyone concerned with the project: that mothballing was tantamount to cancellation; that it would massively increase costs; that it would disrupt the entire system; that the results would be cataclysmic in terms of power planning and economics.

If you were to ask those same people three years later--Washington Public Power Supply System unit 1 was mothballed in 1982 and unit 3 followed

in 1983--the preservation regimes are in place, they are being administered, the licences are being held, and I think most of those involved would agree the predictions of cataclysm were greatly overstated.

I note that as a consequence of the cancellations, with interest rates dropping and some of the labour costs coming under greater control, WPPSS has been able to reduce its estimates of the cost to complete those facilities over the time since the mothballing decision was made.

You may want to take a hard look at that as you try to decide what to do about Darlington. It is the most directly relevant precedent in the US. It was not made to increase coal consumption, though. That is a crucial distinction.

Mr. Brandt: Could I zero in on the environmental question relative to the coal-nuclear option for a moment? Are you suggesting that with a flat out, completely useful conservation program that would reach optimum returns, you could come anywhere close to, say, a 50 per cent reduction in sulphur dioxide emissions in the US if you were to use that as an option rather than nuclear?

In Ontario, using the nuclear option out of the Bruce plant--I believe the estimate there is about 60,000 tons annually; correct me if I am wrong, but that is the figure I recall--if we move to nuclear and therefore reduce the output of coal power, that 60,000 tons is important to the system. However, would you not suggest a nuclear-coal option has to be debated in the US relative to the whole question of sulphur dioxide emissions? Would that not be necessary, coupled with the conservation program you have spoken about this morning, to arrive at reasonable kinds of reductions that would be acceptable to Canada? Those reductions are in the order of 50 per cent.

Mr. Cavanagh: Yes. I would want a fair test. That is, I would want to do something which, as far as I know, no US jurisdiction has seriously done yet, which is to say: "What is the cheapest way of reducing my sulphur emissions by 50 per cent? Is it building new nuclear stations or is it investing in additional conservation?"

You are sceptical that I could reduce sulphur dioxide emissions by 50 per cent. Here are some broad-brush figures. About half of US electricity is now produced by coal-fired units, which vary by a factor of 1:10 in the amount of sulphur dioxide they produce. I would have to knock the dirtiest plants off the system and the question is, could I find, say, 20 per cent savings on my system in order to do that?

I have supplied this committee with examples of four end uses which account for more than a third of US electricity consumption, where savings in the order of 75 to 80 per cent are available using the best technologies we know how to apply. At that point, it seems a straightforward question of economics. Do you want to go after that efficiency or do you want to go after nuclear?

11:50 a.m.

Going after nuclear in the US today is something I think no rational utility executive is going to be willing to do, given the record I just cited to you. Too many people have bet their company and lost. The only two bankruptcies we have had in the US utility system were a direct consequence of investment in large central station units. There is going to be some residual resistance, but what we have is a new direction to point them in. Is it

physically possible? Absolutely. Is it institutionally possible? This is a harder question to answer, one that has to await the kind of analysis I am describing.

Neither the Northwest nor California is a significant contributor to the acid rain problems of this province and of Canada further to the east, so they have not really addressed the issue, but it is one that increasingly ought to be part of the public debate in the midwestern and eastern US. It is my purpose to try to make it that.

Mr. Chairman: Mr. Cavanagh, that was a very concise presentation and we appreciate your attendance.

Mr. Cavanagh: I will rest with my written submission to the committee.

Mr. Chairman: We stand adjourned until 2 p.m.

The committee recessed at 11:52 a.m.

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

TUESDAY, APRIL 1, 1986

Afternoon Sitting

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Brandt, A. S. (Sarnia PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Forsyth, S.

Staff:
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witness:

From Temple, Barker and Sloan:
Jones, D

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Tuesday, April 1, 1986

The committee met at 2:09 p.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: Members of the committee, I apologize to you and particularly to our witness for the confusion in our starting time. I remind members that we hope to start each day at 1:30, following the lunch break. That goes together with the 9:30 a.m. starting time.

The next witness is David Jones, who has already warmed his chair at the table. We ask him to proceed.

TEMPLE, BARKER AND SLOAN

Mr. Jones: I have some relatively brief remarks in four general categories. First, I want to provide a quick overview of the utility planning environment in the United States, as I view it. Second, I want to focus on changes in the planning process that seem to be occurring throughout the industry. Third, I would like specifically to focus on tools, techniques and data inherent in demand-side management. Fourth, I have some concluding observations based on the work I have done. Unfortunately, as I counted them, there were 13. I do not know whether that will be unlucky for us or not.

The first part is a very general overview of utility planning in the United States. Three things really stand out. In the business I am in, I have the opportunity to talk to a lot of people at a lot of different utilities, regulatory agencies and so on. It is fair to say there is emerging consensus that these three issues have come to the front and will continue to be the most prominent issues in the foreseeable future.

The first is that I think it is reasonably clear throughout the United States, much like the situation here in Ontario, that we are now entering a planning window. In many cases utilities in the United States have completed major construction programs or are in the final year or two of bringing on nuclear plants. I think over the next several years the window is open, so to speak. The tools and techniques of planning in the utility business that have been pursued in the past 20 years are changing and they are particularly changing as organizations begin to look at demand-side options as well as supply-side options and begin to integrate those two opportunities. The first observation is that we are now entering this window of very important planning time.

The second is that a critical issue in this planning process is the explicit recognition of uncertainty. Our recent experience with oil prices is an excellent example of the uncertainty that planners in the energy business face. Utilities are beginning to recognize it is important that this uncertainty is explicitly dealt with throughout the planning process. I will have more to say about that later on.

The third observation about planning and about utilities in the United States is that the key issue for them right now is the spectre of deregulation. More utilities in the United States are trying to do things to become more like their competitive market counterparts. I often hear statements to the effect that our marketing department needs to become more like Procter and Gamble or more like IBM, that there is a major change in the orientation from trying to deal with the regulators--and that being a primary concern--to one of preparing the utilities for a deregulated environment in which they are going to have to confront the marketplace and the sister utilities, which they now treat very well, are going to be the competitors in the not-too-distant future.

I think the first part of the presentation are these three general observations: We are now entering the planning era or the planning window; uncertainty is a critical issue in the planning process; and deregulation is also a key driver behind the efforts, organizational and substantive changes of US utilities.

The second set of observations relate to changes in the planning process. Traditionally, utilities have gone through five steps in their planning process. They start with load forecasting and go to generation planning, production costing, finance and rates. That fairly represents the modelling efforts and planning efforts that most utilities undertake. I would like to go through each one of those and suggest what I see are the changes in each of those areas.

In the forecasting area, there is a very definite trend towards end-use modelling and end-use forecasting. Forecasting will be focused, not at forecasting the total amount of electricity consumption in a residential sector, but, for example, would be focused on forecasting the total amount of electricity consumed by air conditioners or in refrigeration. This is a very positive trend because it has implications for a utility's ability to engage in demand-side management since demand-side management, by its nature, focuses on the end use. Only by forecasting the end use can you begin to get a handle on the opportunities that are available. That is a major change.

The second step in the process traditionally was the generation planning process. Given a particular load forecast, the utility would plan to meet that load with the so-called least-cost mix of generating resources. The major change in that area, and it is a very major change, is that they are now looking at resource planning portfolios. In other words, they are including demand-side options as well as supply-side options into what was formerly the generation planning process.

The third step in the process was production costing, in which you dispatched or ran the existing equipment at optimal levels. Generally, there have been relatively few changes in that step of the process. There have been some improvements in the models that are used to do that, again, going towards the idea of incorporating demand-side alternatives as well as pure supply-side alternatives.

The fourth step is the finance area, in which the major change has been the recognition of creative financing arrangements, such as sale and leaseback. The primary motivation for doing this is to provide more flexibility to utilities in the planning process and to reduce some of their financial obligations.

The final step involves rates. The major improvement and major change that is occurring in the rates area is that utilities have clearly begun to recognize and incorporate the idea of price elasticity. They now recognize that there has to be a link from the fifth area of rates back to the first area of load forecasting. Fortunately and unfortunately, I have been in this business long enough to remember when that was not the case. Utilities would assume that load growth was going to be seven per cent a year regardless of what happened to the rates. That is no longer the case, and the utilities do not believe that is the case, in my opinion.

That ends the second part of my presentation. In the third part I want to focus on the practice of demand-side management. It is more or less a blowup of what I referred to earlier as the resource planning portfolio. Rather than focusing only on generation planning, there is clearly a movement to demand-side management.

Demand-side management has nine steps. I will take you through each of the nine and then make some brief remarks about what I think the status of each of the nine is. The nine steps represent a logical process starting with step one, the setting of objectives. What do you want your demand-side management program to do? Step two of the process is to define the alternatives. How can you accomplish your objectives? What technologies or programs are available to do that?

Step three is where you forecast what your expected market penetration is going to be and how many customers are going to sign up for your demand-side program. Step four in the process is to focus on the load shape impact. Given that you have forecasted the number of customers that are going to enrol or participate in this program, what is that going to do to your load shape?

Step five, which is almost totally overlooked in my experience, is the transmission and distribution impact. Virtually all the work you see with respect to demand-side management focuses on the need to meet new generation requirements or the ability to defer new generation requirements. Rarely, if ever, do you see any discussion of the transmission or distribution system, which is a very costly part of the whole utility investment.

<u>2:20 p.m.</u>

Step six includes the other miscellaneous impacts in the use of indigenous resources, for example, and the social implications. Step seven is to conduct the cost-benefit analysis. Once you have quantified all these other things, beginning with the market penetration, load shape impacts, and so on, you then need to do a cost-benefit analysis to determine whether it is a cost-effective option to pursue.

Steps eight and nine tend to be overlooked. Step eight is implementation--how you get this program off the ground. Step nine is monitoring, that is, going back to your original objectives and determining, after the fact, whether you accomplished what you set up.

Let me go through each of those once again and give you at least my opinion of the state of practice of each of those steps.

You would think the objectives part would be very easy. Conceptually, it is very easy to say your reserve margin is 15 per cent and you need to clip

the peak to provide a greater reserve margin in order to increase your reliability. In practice, we find that setting objectives is a lot more difficult than you might think conceptually.

Generally, it requires top management commitment. I emphasize the words "top" and "commitment." If you do not have management commitment at the very top, it is extremely difficult to get a demand-side program or a series of demand-side programs in place. You cannot just change an organization as large as most utilities are by saying you are going to do some controlled water heater experiments. The process of setting objectives, particularly the process of communicating that throughout the organization and of turning the utility around in a cultural sense from being a supply-oriented, engineering-oriented business, to a demand-oriented and customer-oriented business is a very difficult process.

Alternatives basically refer to the cost and performance of specific technologies. I noticed that later in your process, you will be hearing from Art Rosenfeld of Lawrence-Berkeley Laboratory. He is probably the leading person in the United States in terms of discussing that issue--what technologies are available now, what is their performance, how much they cost, and what the next generation of high-efficiency, energy-using equipment will be.

The third step, market penetration, is undoubtedly the most difficult. As I mentioned before, utilities have historically been engineering-oriented, supply-oriented organizations, and appropriately so. As the environment changes, the utilities need to change as well. They have a lot of difficulty with the behavioural responses that are implied by forecasting market penetration. In some sense, it puts them in the same position as Procter and Gamble trying to forecast the number of tubes of toothpaste it will sell. It is a very difficult issue. It is particularly difficult, given the historic legacy that utilities have.

The fourth issue, the load shape impact, is very difficult as well. One of the things often found is that you can run computer models and determine the energy consumption effects of putting insulation in a building. Unfortunately, you often find the behavioural changes, such as the so-called income effect. After people insulate, they turn up the thermostat in order to be warmer. You almost always reduce the net load shape impact that you would have expected from a purely engineering sense.

5. The transmission and distribution impacts, as I mentioned, are largely overlooked. One of my clients has a utility in New York that has about a one per cent load growth. That one per cent represents a lot of minus twos, a lot of plus fours and even some plus 14s, if you look at the transmission and distribution system, as well as just a generation process. It can be very important, especially in areas where you are refurbishing and reinvesting in a transmission distribution system.

6. The issue of other impacts, which I mentioned before, is very difficult. It is a handle and tends not to get any national attention because the issues are regional. In Ohio, for example, if they were to embark on a least-cost planning process, they would want to be sure that it included the use of Ohio coal, which tends to be high in sulphur and leads to a lot of environmental problems.

Looking at those kinds of issues is important. There are different issues in different jurisdictions. In general, the other impacts issue does

not receive a lot of national attention; it tends to be rather specific to the local areas.

7. Cost benefit analysis: Computer models are available to do it. It is relatively straightforward once you can answer the one critical question: from whose point of view? You have participants in the demand-side management program, and you have nonparticipants, utility and society as a whole. The most difficult part of doing the analysis is trying to figure out from whose point of view you want to do it. Once that decision is made, it is relatively straightforward and there are relatively good prototypes to follow.

8. Implementation and monitoring: Implementation is important. Utilities historically have not done these kind of demand-side programs on a large scale. Even if they can get customers excited and interested in these programs, they find that if they do not follow through quickly with implementation or if it is a device that you put on, such as a customer's water heater, and it does not work and there is nobody at the utility to follow up and fix it, the customer gets turned off--no pun intended. They have a negative feeling about the program in general. That obviously has implications for future market penetration.

The final area is monitoring. It is almost totally ignored, and that is probably a result of the fact that utilities for the most part have not gone very far down the path. The exception in the United States is the California utilities. They now are beginning to take a hard look at what they did five years ago and what the hundreds of millions of dollars spent in subsidies actually bought them in terms of reduced loads.

That ends the third part of the presentation focusing specifically on the issue of demand-side management. As I suggested, the fourth part is a number of concluding observations based on the work I have done for the Electric Power Research Institute in the United States, and also the United States Department of Energy. These follow a relatively logical sequence.

1. Because of uncertainty, the planning environment for electric utilities is extremely difficult today.

2. The traditional resource, large central station generation, may not be well suited for that environment because of the uncertainty and lumpiness of the traditional resource.

3. The nontraditional resources--demand side management, which I discussed, and life extension of existing plants, which I did not discuss--have significant potential.

4. Planners must explictly incorporate uncertainty in their efforts by doing risk analysis and by employing a portfolio of resource-planning options. You have to look only at the experience of the past six weeks in the oil markets to know how important it is to be flexible in the face of uncertainty.

<u>2:30 p.m.</u>

5. Any planning effort must look at the market. I define "market" very broadly. There is going to be a lot more interaction between utilities in the future. There are going to be lot more wholesale sales. That has already started in the United States. It may be pure folly for a utility to build

generation capacity when it could get it next door and its next door utility has 50 per cent reserve margins.

On the other hand, it may not be a bad idea to build certain plants on speculation and sell the power in wholesale markets. A southern company in the United States has done that and it has done very well by its stockholders and its customers as a result.

6. United States utilities generally have relatively little experience with demand-side options. As a result, they are considerably less comfortable with the behavioural responses of demand-side programs as opposed to the engineering responses of supply-side options.

7. To reiterate, there are two particular areas that trouble demand-side planners. The first is forecasting market penetration and the second is forecasting load shape impacts. Of these, the first is almost always expressed as the most serious problem and the most serious constraint.

8. The solution to this problem is to increase substantially the interaction that utilities have with their marketplace, both through doing pilot programs and through drastically increasing the amount of market research and understanding of their customers that goes on.

9. The industrial and commercial sectors are a lot more overlooked, in my experience, than the residential sector. There is a school of thought, at least among US utilities, that the industrial and commercial sectors are going to take care of themselves and that conservation in those areas is occurring naturally. I do not believe that is true. There is vast potential in those two areas that has not yet been exploited.

10. As I mentioned several times before, the impact of demand-side management on transmission and distribution efforts is often, if not always, overlooked.

11. Because of the lead time in getting comfortable with demand-side options and because of the current capacity adequacy window throughout North America, I think the time is now to begin to collect the data and do the experiments that will allow utility planners to be more comfortable with demand-side options five years from now.

12. Certain organizations in the United States--the Electric Power Research Institute, the Lawrence-Berkeley Laboratory and Bechtel are the three that I think are the most prominent--are making substantial research contributions to planning in general and to the incorporation of demand-side alternatives in specific.

13. Finally, there are a number of policymakers who are moving forward in the US. I am sure that you are aware of most of these, but I will mention them anyhow: the Northwest Power Planning Council, the state of Michigan, the state of Nevada, the state of Florida and the state of New York. New York's is interesting in that most of the utilities in New York have excess capacity. The public service commission there nevertheless required each utility to spend 0.25 per cent of its resources on beginning to understand customers, with particular emphasis on demand-side management potential.

With that I will close and take any questions you might have.

Mr. Snell: Mr. Jones, can you tell us a bit about the work you have

done with EPRI and the Department of Energy? Those are both very major studies. The committee might be interested in hearing a bit about the role you are playing there.

Mr. Jones: With the Department of Energy we are just finishing a process whereby we have interviewed maybe 60 organizations throughout the country to determine whether there is a federal role in promoting the concept of least-cost planning in the United States, and if so, what the DOE ought to do about it. Many of the findings I have given you here today reflect what we have learned in that process: namely, that market penetration is a critical issue that utilities are moving towards. They are still uncomfortable with demand side. They are moving towards but are still uncomfortable with the process of fully integrating supply and demand options, and so on.

The work I did for the Electric Power Research Institute was to try to bring together all the relevant literature, studies, data bases and so on in the nine areas of demand-side management I went through and to try to produce one document which at a point in time represents how best to do demand-side management initiatives. Recognizing there is still a lot of research that needs to be done and a lot of uncertainty in the market penetration area, nevertheless we thought it was useful to bring together a series of documents that discussed and portrayed the state of the art and the state of practice in each of those nine areas.

Mrs. Grier: Given that the state of the art in North America is not particularly far advanced, are there other jurisdictions such as Europe where demand-side management has been looked at more intensively or been successful?

Mr. Jones: I cannot answer that. I know only illustrations of things. For example, time-abuse rates have been used in Europe with a lot more success than they have been used in the United States, but I could not give you an overall characterization of demand-side management abroad. I know the experience in Australia fairly well. I have done some work there. It is basically nil.

Mr. Snell: The witness we had this morning seemed to make a different point, that in California and the northwest they were quite experienced with demand-side management techniques, estimating penetration levels and doing major experiments such as the Hood River project.

Mr. Jones: Yes, I would have guessed that was his thesis. For reasons not totally clear to me, utilities I have interviewed and talked to about this issue have a pretty strong bias for having their own data. I have worked with probably 40 utilities in my life. Virtually every one has told me, "We are unique because of A, B or C." They all think they are unique and they all believe they have to have their own data. It is not my opinion the Hood River project, as successful as it has been in certain areas, is going to mean much to utilities outside the northwest.

Mr. Snell: I was not suggesting it was applicable to Ontario or anything else. I was just presenting some evidence to you that contrasts with what you said, that most jurisdictions are not advanced in demand-side techniques.

Mr. Jones: I do not disagree with that. I think in the Pacific northwest they are. In California, I think there is a lot of experience with what they have done. However, in retrospect, what they have done has included some mistakes they will readily acknowledge. In California, they more or less

took the ready-aim-fire approach to demand-side management. Rather than analysing it in great detail first, they more or less went ahead and did it. They spent literally hundreds of millions of dollars.

Mr. Snell: Do you think the expense was on the basis of their own analysis that it made sense to them or were they induced to do that?

Mr. Jones: I think it was pretty clearly induced by the regulators in the political environment that existed in California. That is not to say it was a mistake. In retrospect, they could have done things more efficiently. On balance, it has probably been a desirable thing to have done, but with 20:20 hindsight, you can see they probably could have done some things a lot more efficiently than the way they were done.

Mr. Chairman: Are you speaking specifically of demand-side management, not supply-side?

Mr. Jones: Yes, that is correct.

Mr. Chairman: What did California buy? You mentioned it was very slow to monitor what it bought for its money. What did it buy for its money?

2:40 p.m.

Mr. Jones: It spent lots and lots of money on rebates to encourage customers to insulate or weatherize their homes. The critical issue, one that is very difficult to get a handle on, is whether the customers would have done it otherwise. Was it necessary for Pacific Gas and Electric to spend $200 million in rebates? Would that have occurred anyhow? That is the issue where the greatest unknown is.

The fact is they spent the money and they got a lot of conservation. They reduced capacity considerably relative to what it would have been. However, in retrospect, was it the utility action that stimulated that or was it the increase in price? Would they have got it otherwise? That is the research question that really needs to be looked at if you want to know from the utility's point of view whether the rebates were cost-effective.

Mr. Chairman: Would the same analysis be applied in the converse when prices fall? Would you want to be able to determine what pace the retrofit and the conservation program might keep?

Mr. Jones: I think so. There are lots of observers who think energy consumption is going to increase rather substantially if rates fall. It is not clear to me that electric rates are going to fall that much, at least in the United States. Certainly, natural gas rates are falling and oil rates are falling drastically.

Mr. Chairman: I do not know whether you want to get philosophical, but from a philosophical point of view, when you deal with something such as oil, a diminishing resource, should the regulators and the government leaders, the people who should be supplying the leadership, be placing a greater or lesser emphasis on these kinds of demand-side management programs at a time of declining prices?

Mr. Jones: That depends on how far into the future you think oil prices are going to decline. It is a very complicated question. The statement you made has a lot of merit. I would not necessarily say because oil prices

are falling, or more broadly, because energy prices are falling, the government ought not to concern itself with energy or utility planning.

I could make a case, as I think you are doing, that if you believe this fall is temporary, and temporary may be several years, the underlying rationale is that the Organization of Petroleum Exporting Countries is trying to stimulate consumption and then it will be in a position to manage oil markets again. That could cause a lot of economic dislocation when the price goes back up. There is a role for continuing to monitor energy planning during a period of declining prices.

Mr. Haggerty: To follow up on that point on oil pricing, I understand from the news this morning that in Britain the price of crude oil has dropped about US$9. Looking at some of the mothballed generation plants in Ontario, particularly the oil plants, when does it become economical to put those plants back into production if the world price of oil is going to continue to drop? I understand that on the American side, because the price of oil has dropped, the consumer has had a pass-through. There will be a pass-through to local utility rates. It will cost them less to operate oil plants in comparison to coal plants. Have you done any analysis in this area?

Mr. Jones: In terms of what?

Mr. Haggerty: When does it become economical to start buying offshore oil? The price will probably drop lower.

Mr. Jones: I have not. That is a function of each individual utility's planning effort. The production-costing models I mentioned before are designed precisely to look at those kinds of issues.

Mr. Haggerty: Have there been no studies done in the United States?

Mr. Jones: I would not call that a study. It should be an automatic response by a utility. On an almost daily basis, they should be looking at what fuel they should be using given their generating capacity mix. If the price of oil continues to decline or even stays at the low rate that it is now, there is going to be a push to use oil, particularly in units that have been mothballed.

Mr. Haggerty: On the demand-side of management, you talk about the alternative specific technology. Is there anything in this area that will be coming out of the Star Wars project in the United States that will be of benefit in the area of energy conservation?

Mr. Jones: I have no idea.

Mr. Haggerty: Can you be more specific in this area and talk about specific technology--the alternatives.

Mr. Jones: It would be things like high-efficiency refrigerators, air conditioners and motors or things that can control loads so we can turn off water heaters or air conditioners during periods when utilities peak. Rather than building capacity to meet the peak load, we can cycle your water heater or air conditioner so it is off 10 minutes every hour. As I mentioned before, the real expert on energy-using technologies who could probably also answer your Star Wars question is Art Rosenfeld. He is going to be one of your later witnesses.

Mr. Haggerty: I understand there are some programs in the Star Wars project that can store energy which can be used later on.

Mr. Jones: That may well be. I have no idea. There are a number of storage technologies, batteries to store energy for use during peak periods, either on the utility side of the meter or on the customer side of the meter. They have proven to be cost effective in certain applications.

Mr. Brandt: Can you give us some indication of the number of mothballed plants in the United States? What is anticipated with respect to those plants opening at some future point? Obviously they are not going to be mothballed indefinitely.

Mr. Jones: Are you talking about plants that have never operated?

Mr. Brandt: Yes. I forget the exact number, but I heard a figure this morning in the range of 100 plus. I think it was 115 plants or something of that nature right across the United States. That seems like a staggering number of plants that are sitting idle or that are in a state of semi-completion. Do you know the long-range plans for those plants?

Mr. Jones: The utility industry in the United States is very site specific. Virtually all investor-owned utilities are regulated by public service commissions in each of the 50 states. I do not think Nebraska has one, so there are 49 states that regulate utilities. To a great extent, they all have different policies and different philosophies.

As a general rule, it is impossible to say what is going to happen to those plants. It is going to be entirely dependent on the views of the regulators in each of those states. Unfortunately, the regulators tend to turn over pretty quickly. They are generally appointed by governors and it is unusual for a regulator to be in office for more than three or four years.

Clearly, the plants that are mothballed are not going to be brought on line within the time frame of the existing set of regulators. Since regulatory policy is changing quickly, I do not think you can make any insightful or accurate representation of what will happen to those plants. It has a lot to do with the individual public service commissions and their feelings about the plants in their particular state.

2:50 p.m.

Mr. Brandt: Because of the grid tie-in between many of the states to the south of us and Ontario, the plans for some of those plants in particular would impact very dramatically on any export of power out of our jurisdiction. We would be somewhat at the whim of future planning decisions in the US market. Quite obviously, if these plants are brought on stream and they absorb the future demand for hydro power or electricity, that may reduce our opportunities for export.

Mr. Jones: Yes, I would agree 100 per cent. One of the plants you are probably referring to is the Consumers Power plant.

Mr. Brandt: Is that the one in Michigan?

Mr. Jones: Yes. From what I understand and from casual conversations, from an economic point of view the chances are very good that the plant will be completed eventually. Again, I have to go back to the

political realities of the Michigan Public Service Commission. Right now Michigan is conducting a major least-cost planning study for the state.

I think your observation is 100 per cent correct. You really need to take a hard look not only at what is happening in Ontario but also what is happening in the other provinces and in the states. That has implications for what you might export; it could have implications for what you import, under certain conditions. I think it is critical that you take a broad look at the market.

Mr. Brandt: I have a question with respect to the mix of various types of power in the United States. Ours is about a third across the board for the three main generators of hydro electricity. What would the mix be in the US?

Mr. Jones: It varies drastically. I do not have the exact figure.

Mr. Brandt: Are there figures for the US as a whole?

Mr. Jones: Yes, I am sure there are. In the northwest, it is primarily hydro; in the northeast, still primarily oil; in the mid-west, primarily coal; in the southwest, primarily natural gas. Depending on which region of the US you are looking at, you could find a utility which is 90 per cent hydro, 90 per cent gas, 90 per cent oil or 90 per cent coal. I think there are several in South Carolina which are 70 or 80 per cent nuclear. There are figures, but the industry tends to be very segmented in the US and each utility, as I said, thinks it is unique, and definitely does have some unique characteristics.

Mr. Brandt: Could you give your impression of the attitude on the American side of the border with respect to the ongoing debate and dialogue on the sulphur dioxide question? A book was published by an author out of Cleveland, if my memory serves me correctly, which suggested very strongly that the only reason we have a level of anger and frustration with respect to the acid rain question isto increase our export of power to the US and to cause you to close down some of your coal-fired plants. It suggested our anger and frustration were a red herring and that it is really a bogyman we are setting up and we are not really interested in doing anything other than selling more power; that acid rain is not the problem.

I think it is fair to say that is not our position. Naturally, we want to export power if we can do so profitably, but we are not doing that simply to get you to shut down coal-fired plants, with the additional concern of the acid rain question not being of paramount priority in this country. Is there still an attitude in some jurisdictions that we have another agenda we are playing to?

Mr. Jones: I do not think so. It so happens that I was the energy director in Ohio, which is the leading producer of high-sulphur coal.

Mr. Brandt: That is a good state to pick.

Mr. Jones: My orientation and our governor's orientation at the time was: "This is a real problem. Acid rain is a legitimate, environmental problem." It so happens that it has major economic implications for Ohio, and Ohio is trying desperately to promote the development of clean coal-burning technologies. I do not think the attitude is that acid rain is only a figment of somebody's imagination so that Canada can profitably export power.

I do not think I can think of anybody in a policy-making position whom I have run across. I have not run across the President so--

Mr. Brandt: I cannot recall the author of that book, but it seems to me he did come out of Cleveland. Maybe someone else in the committee can help me. The last time I looked, Cleveland was in Ohio.

Mr. Jones: Yes, the last time I looked that was the case, as well. There certainly is concern in Ohio, particularly among coal miners, about the disposition of the acid rain issue. There certainly is concern with respect to what substantially increased electricity prices would do economically to the state. I do not think, however, that anybody denies that acid rain is a real problem that is caused by burning high-sulphur coal in power plants.

Mr. Brandt: That is good to hear.

Mr. Jones: Certainly, I do not subscribe to that.

Mr. McGuigan: I have a supplementary question on the state of plants which have been mothballed before their completion. I recall reading an article which claimed that one reason, or perhaps the main reason, those plants failed to meet the regulation was that the contractors, unlike Ontario Hydro, were not experienced and were not committed to doing quality work. Therefore, some of those plants have been stopped at a point where they could not complete them. The existing cement, iron, steel or whatever just would not meet the requirements. They would have to start all over again to build a proper plant. Do you think that is a fair comment?

Mr. Jones: There are two issues here. There are two plants of which I am aware, the Zimmer plant in Ohio and the Midland plant in Michigan, which had, shall we say, structural problems. I think they were stopped because of a combination of those structural problems and the fact that the utilities had excess capacity already. If either of those had not been the case, they probably would have been completed. Political pressure results from bringing a very expensive nuclear plant into an area that has excess capacity. Those twin forces, combined with the structural or engineering problems that some of them have had, are an overwhelming political combination that leads to unfavourable treatment or denying a rate-base treatment for those plants.

Mr. McGuigan: You are saying that if the band did strike up again, it could probably complete some of those plants?

Mr. Jones: Yes, I think so. It is also a fair statement that Ontario Hydro is a world leader in doing those kinds of plants and the US certainly has not been exemplary in bringing nuclear plants on line within budget and time, largely, as you pointed out, due to inexperience of the architectural and engineering firms.

Mr. McGuigan: At least what Ontario Hydro has built, having its own engineering staff, and I guess we have criticized it at times for having too many engineers, has stood up.

Mrs. Grier: Mr. Jones, this kind of demand-side planning is being urged upon us because of the need for flexibility and the uncertainties. What strikes me is, if we accept those two conditions, whether it makes any sense to confine our analysis merely to the electricity side of the whole energy sector, whether this is the way we ought to be going, whether it is possible to broaden or to do the kind of analysis you are suggesting in the complete energy field.

3 p.m.

Mr. Jones: That is a fair statement. The political regulatory realities often prevent that in the US. From an analytical point of view, I think you are certainly correct. Essentially, what you are looking at is how the services that energy provides, i.e. warmth, movement, hot water and lighting, can be provided to consumers most cheaply or most cost effectively. If that means you burn more gas and a lot of electricity, from a social decision-making point of view, that is the way you ought to go. Clearly, I agree. Looking at least cost in the broad context does imply looking at all energy sources--not just electricity, but propane, wood, natural gas, coal and whatever.

Mrs. Grier: Does that then not lead to the inevitable conclusion that the best instrument to do the analysis is not the utility itself? There has to be some planning mechanism.

Mr. Jones: How did you word that again? If you say inevitably leads to that conclusion, I would not say that it inevitably leads to that conclusion.

Mrs. Grier: Is a utility, such as Ontario Hydro, therefore the best instrument to make that kind of a study?

Mr. Jones: A utility that only produces electricity may have a bias if they want to continue to produce electricity. On the other hand, I do not see any other organizations--and I am not talking about Ontario specifically, but my experience probably in the United States--that are better positioned to do it. The answer is that there are not any. I have not seen any examples of government doing least-cost planning. Even if they did do it, the utilities would have to implement it. It seems to me the easiest and most effective role for government is to provide the incentives for the existing utilities to do it.

Mrs. Grier: In looking at the nine points that you have outlined, you said the crucial question on the cost benefit analysis was who benefits. Within the context we are looking at, from whose point of view should such analysis be done?

Mr. Jones: As an economist, I think it ought to be done from society's point of view. Politicians do not always agree with economists. You may have a situation in which people who participate in a demand-side program find that their bills go down, and you may have a screaming minority whose bills go up.

Take the example of time-of-use rates. Time-of-use rates, when properly done, more perfectly reflect the cost of consuming electricity at that particular time of the day. The political reality in the United States often is that even though the utility can show that its costs are different during different parts of the day and that consumers ought to pay more for consuming during peak periods, legislators are willing to accept that. Often that meant, for example, that rates would go up during the hottest part of the summer, and organizations that were not going to turn off their air conditioning--such as hotels--had to bear an increased share of the total utility costs.

I can look at that and say that is fine because they have been getting a free ride for all these years and it is about time that they bear these costs, but politically that does not fly very well. From whose point of view in the

abstract, academic sense is relatively easy to define. It is only when you start implementing it in a real political setting that you find policy-makers are not always willing to make those kinds of changes.

Mrs. Grier: Is it possible to have a system where there are not losers?

Mr. Jones: It is possible but the number of options that you have and therefore the total demand-side impact that you are going to have is reduced rather dramatically. As I understand the Ontario system, there is not much difference between the marginal cost and the average revenue. The price that you pay for electricity is not much different than the marginal cost of producing it. In that case, it is difficult to institute a program in which you have no losers unless everybody participates.

Mr. Charlton: Can I go back for a moment to what I think was the overall thrust of your presentation and Mr. Snell's question to you about the lack of experience in demand-side planning? My sense of what you are saying, and you can tell me if I am correct, is that there is an overall lack of experience in demand-side planning. Even in jurisdictions such as the northwest and California where they have done some demand-side planning, it is all very new and they have made some mistakes along the way. In other words, where some demand-side planning has been done, it has only scratched the surface. Is the implication of what you are saying that there is a lot more than has been done anywhere yet?

Mr. Jones: I agree with everything you said up until "scratched the surface." It is new, and in 45 of the 50 states they have not scratched the surface, but I do not think it is fair for me to say that in California or in the Pacific northwest they have only scratched the surface. They have done more than that. If you look overall in at least 45 of the 50 states, they have not even scratched the surface. The exceptions are probably the northwest states, Florida and California.

Mr. Charlton: You also mentioned during the course of your presentation, in addition to demand-side management, things like sales and purchases. I do not know how aware you are of the potentials of the situation we have here. We have substantial potential in terms of the demand-side questions we are discussing. We also have some potential in terms of purchases from our neighbouring provinces of Quebec and Manitoba. Do you have any sense of the ways we should be looking at these potentials?

Mr. Jones: My sense is that you very definitely ought to be looking at them. I do not know enough, and even if I knew everything there was to know, I do not think I could sit here and give you an answer. It is a detailed issue that requires a lot of study and there are the uncertainties that were introduced before such as: is the Midland plant in Michigan going to be completed; what are the resource options in New England; could you export power to New England or could you import power from Ohio? You could right now, but if acid rain legislation says you cannot burn high-sulphur coal, then it probably would not be cost-effective.

A lot of issues come into play and it is a major undertaking to understand them all and to understand that if this happens, then we are in this position; if this does not happen, then we are in that position. I do not think you can underestimate the complexity of doing that kind of analysis, because there are many opportunities for both import and export.

Mr. Charlton: When looking at things like that in the planning process, to what extent, in your opinion, should we be weighing things like the security and reliability of supply in our own jurisdiction over and against slightly cheaper power in a purchase? How do you look at that? How do you weigh that in the planning process?

3:10 p.m.

Mr. Jones: That is a philosophical question. My philosophy would be not to weigh it terribly heavily if you are just talking about the security of the supply. If you begin to enter questions such as the economic benefit of stimulating the nuclear industry in Ontario, that is a legitimate question but it is difficult to weigh.

How do you play off the fact that you live in Ontario against the fact that you live in Canada, or the environmental impacts associated with doing those things? These are very difficult issues. Philosophically, I tend not to put a lot of weight on the security of supply issue.

Mr. Snell: Following along on Mr. Charlton's question, did you find in your travels that the utilities in the various jurisdictions tend to make those evaluations? When you say you have interviewed 60 organizations, that is a phenomenal number of contacts you have made. When you talk about flexibility, the lead times of different options and how you actually factor them into the planning process, or the fact that large generating supply systems are 10 or 14 years long and others tend to be shorter, how do you account for those kinds of benefits?

Do you account them in the benefits of conservation for no transmission losses or being environmentally clean or do you factor them into other social objectives, such as environmental pollution or the safety issue with the nuclear option? Are these tradeoffs being consciously made in other jurisdictions? Are they being made by the utilities or are they being made by the regulators?

Mr. Jones: They are clearly not being made by the regulators. Only a handful of regulators or regulatory commissions in the US would even recognize the concept of least-cost planning if you mentioned it to them. To the extent that those kinds of decisions are being made, they are clearly being made by the utilities.

Let us go back to the security of supply issue or the use of indigenous resources. I do not think the utilities put a lot of weight on whether the resource they are using, the coal or gas they are burning, comes from within the state where they happen to operate. Many of the US utilities operate in several states, for example. Those are not major issues at all in the US.

Mr. Snell: Let us presume that you could poll the public to determine the most socially acceptable options and rank them. If that is being done even in a cryptic sense in some jurisdictions, do they tend to factor that into the planning process, for example, by giving a 10 per cent benefit to conservation, as the Northwest Power Planning Council does? Or do they tend to do that right in the inputs to the modelling in determining what is cost-effective? Or do they tend to do that at the end of the planning process, coming out with the order of options they think best for their resource portfolio, then matching that to a social scale for the softer side that is very difficult to quantify?

What I am trying to get at and illuminate for the committee and myself is the point in the planning process at which this kind of consideration occurs, wherever it is occurring. You are saying it is not occurring in a lot of places. Where it does occur, do they do it at the front end and say: "Do not consider the nuclear option. We want you to go conservation," and then the planning process begins? Or does the planning process go through and then these objectives are placed upon them?

Mr. Jones: Where it is happening--and I want to reiterate that the kind of analysis you are talking about now is not happening very often; I would say in fewer than five states--it tends to happen at the front end. I have had a number of utility executives tell me, "The planning models still show nuclear to be the least-cost option, but we are not going to do nuclear."

The risks and the regulatory pressures are so great in the US political environment that to do nuclear is just out, so we just throw that out. We do not even analyse that any more. The answer to your question is, where it is being done--and there are precious few places where it is--it is being done more or less in advance, in the sense that there are options that are not even considered because they are politically disastrous.

Mr. Snell: That brings up an interesting point. Ontario Hydro has stated to us in interviews that it does not consider implementation issues, i.e. if the demand-side option is not implementable because the municipalities will not go along with it or if there is an assessment that nuclear would not be implementable because it would take too long under the Environmental Assessment Act and they cannot get transmission lines through in ten years' time.

Do other jurisdictions consider implementation as a factor before they even begin? I gather that is what you are saying. You take a look at nuclear and say, "We are not going to get that kind of plant through given the political environment." Do they rule that option out at the beginning?

Mr. Jones: The utilities rule it out. There is no deliberate or explicit link between policymakers and utilities that I am aware of. If you are a utility executive, it is second nature not to build a nuclear plant in the United States. I do not think there are any utilities in the US planning any kind of plants. I do not know the numbers, but I would be willing to commit to you that 95 per cent of the utilities in the US do not have any plans to build any kind of plants at this point.

Mr. Snell: There are two perspectives to that. I am sure we will hear them during the hearings. One side will say that kind of situation is going to develop or result in very creative approaches to alternatives such as other energy forms, demand-side management techniques, etc. The other side we are going to hear loud and clear will say that it will create chaos, that we are going to be short of power and that there will be brownouts and blackouts. They say demand is picking up now and this will be the argument of our nuclear association up here. What is your opinion on that?

Mr. Jones: I do not think there will be chaos. I have an intuitive faith that the marketplace will react in time to prevent those things. I have not studied the issue of load growth in particular jurisdictions, but my intuitive hunch is that a lot of options will be developed. If load growth is strong, if plants are not being built and if companies in the United States are not given the incentives to build, I think the marketplace will come forth with lots of options such as cogeneration, fuel cells and a number of other things.

Mr. Snell: Let us say we want to induce creative alternatives or creative energy sources on the demand side here. A term I have heard used before is demand-side infrastructure, which is building the capability to be able to utilize demand-side alternatives when you need them. Even though you may not need them now, at least you are building that infrastructure. If you were a policymaker advising utilities that were down the learning curve on the demand side, what things would you encourage them to do to build this so-called demand-side infrastructure?

Mr. Jones: I would encourage them to confront their marketplace in lots of ways, with lots of programs, and to collect lots of data and begin to understand their customers. That is as simple and straightforward as I can put it. The US utilities do not do a good job of that. In many cases they do not understand how their consumers use electricity. They have no idea why they use it that way, what their motivations are or how to influence them.

Mr. Snell: You may be familiar, as I am, with the marketing techniques and consumer research that other industries do. It is extensive. They are much more sophisticated in that kind of data gathering. You are talking about experiments in certain data-gathering efforts. For the benefit of the committee, could you elaborate a bit more on some of the more progressive things the utilities are doing? Is Hood River an example of that kind of thing? Do you pick a community?

Mr. Jones: The New York situation is interesting. As I mentioned before, the commission told the utilities to spend 0.25 per cent of their revenues on learning things about the demand side. They acknowledged that conservation may not be cost-effective right now because of excess capacity.

3:20 p.m.

Mr. Snell: Did they actually legislate a certain amount of the revenues to be spent?

Mr. Jones: The Public Service Commission ordered it.

The utilities there are doing lots of primary data collection and they are doing lots of energy audits. In the process of doing energy audits, for instance, they will take their 500 largest commercial sector customers and send somebody out to do a two-, three- or four-hour audit of the premises. That serves two purposes: (1), it tells the customer what cost-effective demand-side management strategies he or she can employ, and (2), it gives the utility a lot more information about the equipment that customer uses, how he uses it, what the age of the equipment is, what the efficiency of the equipment is, and in certain cases you can ask motivational questions.

Some of my colleagues did a project in which they found that commercial sector customers were not particularly interested in economic benefits of demand-side options. What they were most interested in was risk avoidance. If the utility went to the commercial customers and said, "We think this is going to save you X, and we are going to guarantee it," then everybody would sign up and everybody would participate. If the utility went to the customer and said, "We will give you a three per cent loan to do this," there was a lot less interest. They were more willing to take less financial assistance with certainty than to take some sort of low-cost loan, or rebate or something to take a particular demand-side action.

That is an example of the kind of thing utilities need to know, how to

motivate their customers to do these things, before demand-side options are, as you said, implementable. I do not think any utility in the United States--I am talking even about the leaders now--has a good idea of how its customers make energy decisions on a broad scale.

Mr. Chairman: The fundamental thing you are saying is that the utility first has to do the analysis of the marketplace and of the customers before it starts motivating them and creating consumption and usage or some alternative pattern to what is going on now.

Mr. Jones: I think it is useful. Again, you could take the California approach. They just said "Go do it," and the utilities went and did it and they spent hundreds of millions. Some good and some bad came out of it.

The other approach would be to begin to develop an understanding of how your customers use energy, what motivates them, what appliance stock they have and so on, and then to target programs at specific market segments with specific messages and specific inducements that are likely to move them in a certain direction. I think it is basic market research and consumer behaviour understanding that stand between current planning efforts in the United States and large-scale implementation of demand-side management options.

Mr. Snell: It sounds like quite a major transition for a lot of utilities to bring on that scale of research. Are you familiar with utilities going through that transition and any organizational changes they have gone through to accommodate that kind of thrust?

Mr. Jones: The organizational changes are beginning to show up. The first thing that is done is to create demand planning. Five years ago you probably would not have found more than a handful of utilities that had demand planning departments. Second, you need to integrate the supply and demand planning. Third, you need to give your marketing--marketing broadly defined to include marketing of conservation, load management and so on--a full kit of resources, including market research, pricing and promotional activities.

Mr. Snell: Excuse me, Mr. Jones, you say "integrating,." I know that is more in the process of planning, but structurally in the organization, have they separated conservation? In Ontario Hydro it is in the marketing department. Is it common in other jurisdictions to have conservation and marketing in the same department? Do they call it demand-side managment now or do they call it energy services? I envision a whole team of these energy audit people out dealing with the customer in a much closer relationship. I am not sure if we have that kind of thing here to that degree. I know we have had an energy audit program and marketing representatives, but have the utilities that have evolved to this approach you are talking about changed their organization to deal with it, in addition to just throwing money at it, such as 2.5 per cent of their budget?

Mr. Jones: Yes, and I think the changes they are doing are to integrate supply and demand planning efforts under one vice-president. To put them organizationally together is one step. A second step is to increase the resources of the marketing department, broadly defined. You asked whether conservation people and marketing people are commonly in the same department. I think the answer is yes. I think most utilities that are active in demand-side management in the US view the concept pretty broadly. I will give you an example in Florida, which is a state where they have a very strong mandate to minimize peak load growth. At the same time, at the regulatory level, they are not discouraging marketing programs, such as security

lighting, which is an off-peak night-time load which actually promotes the sale of more electricity, but at the same time reduces rates. The Florida Public Service Commission has allowed and even encouraged that kind of activity. That is a good example of a utility that has conservation programs in the so-called marketing department.

The bigger change is in resources devoted to the marketing department. The marketing department is now capturing the market research function, the pricing or rates function, and in some cases the public relations function. The major organizational change that is occurring is a consolidation of functions under the marketing umbrella. Whether marketing is defined as selling more electricity or selling less electricity, it is all part of the demand-side management effort. That function has substantially increased its resources at many US utilities.

Mr. Chairman: Thank you very much, Mr. Jones. We appreciate your presentation.

Mrs. Grier: May I ask a question on Mr. Snell's presentation at the very beginning of the day?

Mr. Chairman: Please do.

Mrs. Grier: You spelled out five key issues. In one of them, you ask, "How do we ensure that societal values are incorporated into Ontario Hydro's planning process?" Another was, "How do we ensure that all options are treated as equally as possible in Ontario Hydro's planning and in the general marketplace?" That seems to me to be at variance both with the question you just asked Mr. Jones and with your very last key issue, which was the appropriate role for government to take in Ontario Hydro's demand and supply options. I wonder why you worded them the way you did.

Mr. Snell: The way it was worded was not meant to presume that integration happens in Ontario Hydro. Maybe the role of government should be first. Whether it happens in Ontario Hydro or it is done by the government is something I guess we are to decide.

Mrs. Grier: You did not mean to imply that the incorporation of societal values would happen exclusively during Ontario Hydro's own planning process.

Mr. Snell: No. Except that, realizing the fact that Ontario Hydro is in the middle of a study now that is looking at options and ranking them, the question I was asking is, "Are these inputs to the planning process or something that the government does after Hydro has done its ranking?" Whether we want to accept it or not, they are involved in a public consultation program that is assessing the values of the public. They are going to put it in in their manner, the way they determine it. We may not think that is the optimal way. You are correct; I was not trying to imply that such is the way it should be.

Mrs. Grier: Is the issue not perhaps more the weight given to societal values in Ontario Hydro's planning process and the nature of those values rather than ensuring that they are incorporated?

Mr. Snell: Yes.

Mr. Chairman: Members of the committee, I seek your clarification on

our schedule. This schedule lists us as meeting tomorrow at 9:30, sitting until 12:30, adjourning until two, and sitting from two to 4:30. Does that meet with your approval?

Mr. Ashe: That is what it says. Today it was scheduled for 1:30 but we did not start at 1:30.

Mr. Chairman: I want us all to be clear about what our schedule is.

Mr. Snell: I would like to speak to that for a moment. What we have tried to do in the schedule is allow for an hour and a half for lunch. Some mornings we are going to have two presenters. We might go until 12:30 and come back at two. When we can finish at noon, we can start at 1:30. It may vary some days. We have tried not to cram so much in the days and the mornings as we did with the Darlington review, which tended to run over a number of times. So the luncheon does not always start at 12 noon. Sometimes it starts at 12:30. It will depend on how the flow goes that day. I have tried to indicate in the schedule what the best guess of that would be.

Then we have the problem of witnesses coming from outside who do not have the advantage of knowing what went on in the morning and we are stuck with going by that schedule. With Ontario Hydro, I think we are fairly safe in setting the schedule now and going by it. What we have planned is three hours in the morning and two and a half in the afternoon, so it is a little lighter in the afternoon.

Mr. Ashe: I have one suggestion that I am sure nobody will violently disagree with. I think we should always attempt to move the lunch hour ahead a little on Friday to end at a better time because of traffic problems and transportation for those from out of town and so on.

Mr. Snell: On all Fridays, we have scheduled only one witness, so we should be able to end about three o'clock or 3:30, presuming we start promptly at 1:30 or two o'clock, when the time is called.

Mr. Ashe: You have scheduled four people for Friday. Are they all in the morning?

Mr. Snell: There is just one in the afternoon.

Mr. Ashe: Okay.

Mr. Chairman: We stand adjourned until 9:30 tomorrow morning.

The committee adjourned at 3:33 p.m.

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

WEDNESDAY, APRIL 2, 1986

Morning Sitting

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Leluk, N. G. (York West PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Forsyth, S.

Staff:
Moore, L., Adviser, Electricity Section, Policy and Planning Division, Ministry of Energy
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witness:

From Ontario Hydro:
Campbell, T., Chairman
Franklin, R. C., President
Niitenberg, A., Executive Vice-President, Operations
McConnell, L. G., Vice-President, Power System Program

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday, April 2, 1986

The committee met at 9:37 a.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: We are doing well, members of the committee. We are only seven minutes late.

The next two days of hearings are allocated to Ontario Hydro. We have an esteemed panel of Ontario Hydro executives sitting in front of us. I ask the chairman to make his opening remarks.

Mr. Campbell: We are glad to be back.

Mr. Ashe: Really.

Mrs. Grier: More enthusiasm.

Mr. Campbell: Six months ago, we took the opportunity to present information and to answer your questions about Ontario's future electrical energy needs. The focus of those sessions last October was the Darlington nuclear generating station. I understand the committee would like us to come back and deal with that subject in some detail, perhaps at the windup of this part of the hearings. With your agreement, we will not focus on that question for the next few days. However, we will come back to it.

Again, we appreciate the opportunity to present committee members with our views on meeting future energy needs. We hope to provide you with a more detailed look at our demand and supply options study.

Before I comment further about the study itself, I would like to emphasize Ontario Hydro's responsibilities to the electricity users of the province. We do not have shareholders, as most United States utilities do, who want us to make a profit. Therefore, we do not have the narrow interest that this would imply. Our shareholders are, in fact, the people of Ontario. As a result, our responsibility is not only to provide the power they need, but also to provide it in a way and at a cost that our customers find acceptable.

We provide power for just about all the nine million people in Ontario. We have a lot of contact with our customers and they share their views with us in many ways. In addition, we are in regular contact with all our major industries, every major industry in Ontario that creates the employment that provides the backbone of our economy: steel, automobile, forest products, mining, resource and agriculture.

Our new president Bob Franklin, who is with me here today, and I met just a few nights ago with representatives of our largest industries: Ford, Stelco and a number of others.

Since we are planning on behalf of all the customers and all the industries in Ontario, we want to make sure of their input. As I said before, the demand and supply study is one of the most important pieces of planning ever undertaken by Ontario Hydro, and perhaps in Ontario itself, as far as our economic future is concerned. That is why we need the input of the members of this committee and why it is vital that the public has an opportunity to express itself on planning issues.

We invited more than 120 provincial organizations to discuss planning and to tell us what they thought were the most important issues and values in electrical power planning. Their briefs will be going to Ontario Hydro's board of directors. I have to comment here. The board of directors of Hydro is an interesting board. It is a citizens' board. It is made up of individuals from various walks of life from all parts of the province. They run Hydro. They have an input as well.

We provided other avenues for public input and hosted discussions around the province with community leaders and citizens in general. We want to make sure that as a provincial utility we get the best province-wide perspectives.

We are in a fortunate position of having some time to plan. We have a few years. In the past, that was not always the case. It would be unfortunate for all of us, I believe, if we drew premature conclusions when there is still so much to consider and so many unknowns. That is a worry I have. There is a danger of jumping to premature conclusions to some of these complex problems. I believe our most important consideration is that planning be founded on a thorough evaluation of all relevant factors. That includes social, technical, environmental and economical costs.

I think it is prudent to reserve judgement until the study is complete in a year and a half's time. I should explain that. We are talking about our supply and demand study. The same staff that had been working on the documentation for this committee are the people who are doing our supply and demand study. They have had to down tools on that job to do this job for the last six months.

As a result, our timetable has slipped by about six or seven months on that project. We will have an interim report in about seven months, assuming we can get our staff back to work after this committee completes its deliberations in the next few weeks. We suggest that would be a good breathing space to allow us to complete that work. We will have an interim report in seven months. That will go back to the public, to the government and to various groups for further input and comment. Our schedule is that in about a year and a half from now we believe we will be in a position to have a framework to make some serious decisions. That is the kind of framework we are talking about here.

The time frame we are looking at in the supply and demand study--and there is some confusion here, I think--is the late 1990s and beyond, that is, the 1990s and into the year 2000. On the other hand, the completion of the Darlington station is essential as part of the system required to be in place to meet the needs in the early part of the 1990s. In other words, our supply and demand study does not include Darlington. It looks at a time period beyond Darlington, when Darlington is scheduled to be completed, beyond 1992.

I have to stress that the demand and supply study is an overall strategy for meeting the province's future needs for electricity. Our review of the

options looks at balancing future supply and future demand. It is not two studies; supply and demand is a single study with two components. It is very unlikely that one of these components alone will be enough. In other words, we believe we are going to need both; we are going to need some new sources of supply and we are going to do a lot more to manage the demand for electricity.

What we hope to do in the next two days is present a review of some of the ways Ontario Hydro might augment the supply and manage the demand for electrical power in the province in the coming years. That is what the presentation in the next couple of days will lay out for you, to the best of our ability.

We appreciate the opportunity to review some of these approaches with you. In fact, we would like to have more time to do this. We have absolutely no fear or concern about sound decisions being made if we have a thorough evaluation of the facts. The only concern I have is that premature conclusions might be reached if we do not have sufficient time to evaluate the facts.

Our focus today is on the future, but I would like to take a minute to talk about the past. I think we have had some misunderstandings about that. The history of this province is something I take a great deal of personal interest in. I also think it is instructive to see how our involvement with demand activities has developed over the years.

Ontario Hydro's experience with influencing customer demand goes back to the early part of the century, when we recognized that there was an important consideration. In 1933, electrical utilities had introduced water heater controls that allowed the utility to cut power to them during the peak electrical load. While this did not cause noticeable inconvenience to customers, it did allow utilities to reduce their costs by reducing their peak demand charges and minimizing the pressure to expand their distribution systems. It is good for municipalities. It is also good for us because it reduces the peak demand, which would require us to build new plants.

In large utilities which have sufficient customers to justify the expense of the equipment that it takes to do that, this is still one of the major load-shifting devices we have today. That is why we promote water heaters through the Blue Jay ads and so forth because they are actually an efficiency conservation tool. They allow us to control our load and shift it off peak periods of time. This is conservation in the true sense of the word, which means more efficient use of our existing system.

In 1935, Ontario Hydro took the initiative in developing insulated water heaters. Before that time, water tanks were simply bare metal and very inefficient. I remember when I was a kid, we heated with a wood stove, which also heated the water tank. It did not have any insulation; so to find out if there was enough hot water for a bath, you had to run your hand down the tank to see how much water was there. Ontario Hydro developed the insulated water heater.

In the 1950s, we were involved in several important developments affecting energy efficiency. For example, Ontario Hydro vigorously promoted the conversion of incandescent to fluorescent lighting, which gives more light, but reduces the amount of electricity consumed. I have here today--I will pass it around--another gadget that carries that one step further.

As you know, most commercial, industrial and institutional lighting is now fluorescent, which is up to 80 per cent more efficient. In other words, it can produce as much light with only 20 per cent of the power. One of the problems with incandescent lighting, which most people prefer for their houses, is that it is less efficient.

There is a new gadget put out by Philips Electronics Ltd. I am not plugging Philips or other makers either, but this is the first one on the market that I have been able to get. It plugs into a normal light socket. There are different-sized units that plug into it. The colour is not the ghastly blue of some fluorescent lighting. It is more of the warm tone that people would find more acceptable in their living rooms.

There are some advantages to this, and we are going to be promoting things like this. For example, it costs considerably more than a light bulb--maybe 20 times as much--but it lasts from 10 to 20 times as long, so it evens out. It uses only 20 per cent of the power to produce the same amount of light. I am going to pass it around. It is an interesting gadget.

Mr. Ashe: If it does not get back to you, you will understand.

Mr. Polsinelli: You did not bring one for each committee member?

Mr. Campbell: Perhaps even more important was our involvement in home energy improvements. Hydro's triple seal of quality program was started in 1959 and specified six inches of insulation in ceilings, four inches in walls and two inches in floors. We were even instrumental in persuading insulation manufacturers to agree to label their products on the basis of standard insulation ratings so that customers would know what they were getting.

9:50 a.m.

Ontario Hydro's work in improving the efficient use of energy in the home led us to work with manufacturers from 1966 to 1974 in developing better thermostats and helping to optimize furnace design. For years, for example, home furnaces were often very much oversized and they wasted energy. Hydro's research demonstrated to furnace manufacturers that smaller units could provide adequate comfort with less energy input.

In 1966, a Hydro research team pioneered what is now the accepted method for testing houses for airtightness. As a result, sources of and solutions for heat loss have been identified. The technique has now been universally adopted and a worldwide industry, based on research that was carried out by Ontario Hydro to test airtightness and develop airsealing methods, has grown up.

Perhaps a more visible contribution was Ontario Hydro's development of a heat pump for the Canadian climate, beginning in 1976. We estimate that improvements in cold weather performance alone could result in $18 million worth of energy savings over the next few years from the more efficient heat pumps we have developed for our climate.

In 1982, we began helping a manufacturer in Niagara Falls with a combination heat pump and gas-condensing furnace. We provided testing and suggested some modifications to this high efficiency furnace. The unit, now being field-tested, uses natural or propane gas in cold weather and electricity in mild weather and air-conditioning during the summer. It is

energy efficient for the customer and means less peak load for us. That is helpful. That is an efficiency measure we are promoting.

Perhaps the most familiar work Ontario Hydro has done in conservation is the extensive appliance testing we have been doing since 1977 for the federal government's Energuide program. We did the testing for all of the appliances for that program. It was very successful because a lot of inefficient appliances were taken off the market. Every new major appliance that comes on the market must go through an energy efficiency testing program.

To date, the program has been extremely successful. Because it requires major appliances to display energy consumption labels, appliances have been redesigned and improved. We estimate that the accumulated overall energy saving to customers has been about $1.2 billion from that program alone. That is an incredible saving.

It appears that the federal government might withdraw the regulations that made Energuide possible. We are concerned about that. Three months ago, I wrote to the federal Minister of Consumer and Corporate Affairs and strongly urged that the program be continued. I impressed upon the minister the consumer's need for the information given on the Energuide labels, especially if inefficient appliances from offshore should hit the Canadian market. We would be vulnerable to that. If we got rid of those labels, we could get flooded by inefficient appliances from other places. I do not know whether the government has yet reconsidered its plans, but continued Energuide funding is something that is in the best interests of the electrical customers of Canada. It is something Hydro strongly supports to this day.

This is something I hope elected members may be able to help us with with respect to helping persuade the federal government that this is a program that has a tremendous payoff. We would like to keep it going. If the federal government abandons it, we should take steps, perhaps consider legislation, but we cannot do it ourselves. It would require a legislated program to do it in Ontario. It would not be as good as for all of Canada, but it is something important for us to consider.

Summing up, Ontario Hydro has a long history of efforts to influence the demand for electricity. Our work in this field has been important and effective. However, there is an enormous amount of new work to be done. That is mostly because the framework for conservation and energy efficiency in the 1980s will have to be different.

In the years ahead, demand management will be an integral part of an overall strategy for meeting future needs. Central to Hydro's planning philosophy is the recognition that co-operative efforts by utilities, government and customers can significantly reduce growth in peak energy requirements and limit the need to construct new plants.

In the past, energy conservation and efficiency measures were things we promoted and helped develop. In the future, we will carry that a step further and undertake investments--we may have to pay for that--in demand management programs, similar to the way we make investments in new plants. Putting money into conservation and efficiency programs will be evaluated for potential benefits on the same basis as putting money into new facilities.

I believe we will find that some forms of incentive are the best investment we can make. That does not mean every demand management program

will have an equal chance of being successful. We would like to keep an open mind about this. As circumstances that make up our energy environment change, we have to be prepared to change. Some of the programs that worked in the past may not continue, and others that did not look very promising a few years ago may look a better bet.

Let me elaborate on two points about the supply-demand study and the presentation you will be hearing. First, the study is a planning tool. It is not in itself a specific plan for everything we should do. It is a planning tool, a framework to allow reasoned decisions to be made.

Second, the study is aimed to be comprehensive, not only in the sense of keeping an open mind to all the options but also in its perspective. We understand that the needs we have to meet are those of the province as a whole, not just those of individual customers. You will be hearing about some of the ways we might help customers make more efficient use of electricity. We are looking at more than just electrical efficiency; we are also looking at the overall effectiveness of using electricity.

New applications for electricity can help make more effective use of other resources, such as other forms of energy. For example, perhaps we should sell electric motors that compress natural gas to operate your car; that is a combination of electricity and natural gas. Other areas can help us process raw materials or save time, which is perhaps our most important commodity.

Last fall I told you about the thermomechanical pulping process, which can increase energy efficiency, improve the quality of the working environment and the natural environment and imrpove product quality. I am told that unless we do this, our pulp and paper industry will not be competitive any more. This will take massive amounts of new electricity. They have motors that use 18,000 to 25,000 horsepower in that process. Talk to René Fontaine about that; he is very concerned about the competitive position of the pulp and paper industry in northern Ontario. Quebec is providing massive incentives for its industries to convert to that process. If we do not do things like that, if we do not keep up, our industry and jobs will be at risk.

A few months ago, Hydro did a feasibility study for a large rubber manufacturer to see if electricity could help reduce the time needed to cure large bales of rubber used in the manufacturing process. Current technology using natural gas requires four to seven days to bring the rubber bales up to the right temperature. These are huge, one-ton bales of rubber. We demonstrated that using a microwave process could reduce the heating time to less than half a day; that is, from seven days to half a day. That is a tremendous saving in time, and the total energy cost is much less.

Here was a case where the effectiveness of electricity was not only its heating efficiency but also its ability to speed up the manufacturing process by making sure that process is more efficient and by cutting out the bottlenecks. That, by the way, is exactly the kind of thing that keeps our industries competitive. We are going to have to do more of that. That is one example of how electrical technology can help Ontario industries become competitive.

That is why effective demand management means many things. It means conserving by reducing waste. It also means making improvements in the way electricity is used and developing new uses for electricity which present a net benefit for the customer and the province. That is why I believe that increasing the electrical intensity of our economy can benefit the province.

That may sound like a radical statement, because some people are talking about decreasing electrical intensity, but you have to consider that we live in a very competitive world; if you catalogue our natural advantages, one is that we have reliable, low-cost electricity.

The multibillion-dollar expansion of the General Motors plant in Oshawa will involve sophisticated electrical-intensive robots and other machinery. Low-cost and reliable electrical power will be essential for that plant and will help create jobs for people.

10 a.m.

I want to make one special plea to the committee. The reliability of our system must never be compromised. None of us, on the committee, in Hydro or in the government, would ever be pardoned if we took decisions in the next few years that cut supply and reliability too fine and cause power shortages as a result. We heard last year from the United States' own power organization, the North American Electric Reliability Council, that some US utilities are doing precisely that.

I have a more recent statement from evidence presented to the US Senate energy committee's oversight hearings last July. It clearly depicted a situation where economic growth in some regions of the US will be held back because of inadequate electrical supply.

Daniel Boggs, Deputy Secretary of the United States Department of Energy, in his testimony--it is in the Congressional Record of the US Senate--said, "The lights will start to go out some time in the 1990s and will do so increasingly as the decade progresses."

Boggs went on to tell the committee that their problem stemmed from the fact there is not enough planned construction of new facilities to meet demand for growth adequately. He emphasized the effect of shortages of economic power on the competitive position of some American industries.

I do not wish our friends any bad luck, but if they bring that upon themselves by shortsightedness--and they have been warned--then I believe the completion of Darlington will afford us a great opportunity to increase our competitive position as a place to invest and create jobs.

We must always have some surplus of power. Power plants, like all machines, are subject to breakdown. Our nuclear plants have consistently led the world in reliability, but they have also had outages. We can expect and predict they will have more outages as they age. That is the normal course of any kind of machinery.

The irony was that last fall, while this committee was drawing up its interim report, which said we would have power surpluses to the year 2000, we actually ran short of power 15 years ahead of that. At the same time, Quebec ran short of power and cut us off. There is a lesson there for those who say we should depend completely on others for a source of power. We had to buy high-cost, oil-generated power from Michigan to keep our lights on. That happened not just once but on several occasions this past winter.

If we have a temporary surplus of power, not only is it insurance but also it can be sold at a profit until we need it ourselves. However, if we are short of power, there is no way we will get the kind of investment that General Motors has just announced for Oshawa. Honda, Toyota, Ford, Renault-American Motors--none of those plants would be here if we had power shortages.

I plead with you to be sceptical of the arguments of people who promise simple and easy solutions to complicated problems. They will not be around or accountable if we run short of power. You will not be able to find them. I suggest that you listen carefully to our customers, large and small, because they tell us that (1) reliability and (2) cost are essential or they will not survive. These are the people who know about conservation and efficiency, because their survival depends on efficiency. They are doing a very good job in improving effiency; they know what can be done through that.

We met with a group the other day that represents 250,000 employees. Those are the numbers of jobs we are talking about. There was just one group around the table, and it has 250,000 employees. They are the people who create the jobs. They know about efficiency. They are working hard to get efficiency because that profit helps them stay in business. They are competing in a world market. Their concerns, increasingly expressed, are that we are in great danger of underestimating our power requirements in the next decade, and not that we will have excess power. I urge you to listen to our customers and your customers.

Evaluating the net costs and benefits of electricity for the province involves many factors: energy efficiency, long-term costs, convenience to the customers, environmental effects, product quality and effects on provincial employment. There are many factors to consider in evaluating our options, and inevitably there will be tradeoffs. That is why I would like your views on the relative importance of the various factors used to evaluate the options we will be putting forward.

We want to formulate a comprehensive strategy for managing demand as a way of meeting a significant amount of the province's future energy needs. In addition, if our employment base is going to continue to grow, we will require additional sources of supply. There is no question about that. Both demand and supply options will be touched on in the next few days. In the next year, the demand/supply study will review them in sufficient depth to permit some reasoned, long-term decision-making.

At this point, I want to mention two other things that have come to my attention. It has recently come out that one of the key factors in dropping oil prices right now is that since the Arab oil embargoes in the 1970s, the advanced countries of the world--the United States, Germany, France, Japan, Canada and many others to a lesser extent--have switched massively to nuclear power to the point where nuclear power now produces the equivalent of six to seven million barrels a day. That is the combined output of the North Sea and Mexico and twice the output of Saudi Arabia today. That is one of the reasons that oil prices are dropping. If it were not for the nuclear power we have, the world would still be hostage to people who wanted to cut off supply. That is an important consideration.

The other point is that I read a comment from Dr. Harro Trenkler, the director of the major German electric utility on the structure of electric generation in the Federal Republic of Germany. He said:

"Although the situation of energy supply in the federal republic is at present characterized by ample availability of different energy sources and a more than sufficient capacity of conversion plants, these conditions cannot be taken for granted in the long run. One must bear in mind"--and I found this quite startling--"that most likely as much primary energy will be consumed worldwide within the next 30 years as has been consumed in the history of mankind to date."

That is what the Federal Republic of Germany is basing its planning on: As much power will be consumed in the next 30 years as has been consumed in the history of mankind to date. It is incredible. That is the time period we are planning for. I throw that out to indicate this is a very important and consequential issue we are dealing with, and we take it very seriously.

At this point, I would like to introduce our new president, Bob Franklin, who will comment on some of the issues involved in developing demand management. We believe pursuing demand initiatives is an appropriate and promising approach to help get the best use of Ontario's resources.

10:10 a.m.

Mr. Franklin: Before I start talking about demand management, I would like to say a few words by way of introduction, since this is the first time I have had the privilege of meeting with this committee. I have been looking forward to this because we are starting a study that is probably the most extensive we have done in this field and probably will have the greatest impact on the future direction of Ontario Hydro.

With only a few weeks' experience in an electrical utility, I am the first to admit that I do not profess to have a deep understanding of this demand-supply study. Frankly, though, that could be an advantage as much as a disadvantage: I think I can be more objective. I do not have any preconceived notions about where this study is likely to end. I have no entrenched positions about its elements or components. I have no need to defend the prior positions of anyone. I am in a position where I can challenge this perhaps more than anyone else--the approaches that are taken, the methods, the data and, eventually, the conclusions.

I intend to bring to this whole study a healthy degree of criticism, one might say scepticism. I do not take anything for granted because I do not have to. What I do not want at the end is a gospel according to Ontario Hydro about energy supply or demand. I am sincere when I say I want it to be a thorough, objective and fair study. It will not be the last word, because this is a dynamic industry and it will have to be open to review from time to time.

One thing I have learned at Ontario Hydro in the past few weeks is that it has a wealth of technical and analytical skills. If we combine that with my healthy scepticism and your input and the public's input, we will end up with a study that all of us can be proud of. That is the attitude I intend to bring to this exercise.

Let me talk for a moment about the subject of demand management. I have said I am not familiar with all the details of this subject, and that is true. However, my 30 years at Canadian National did give me a good grounding in some of the kinds of issues and questions that we and you will be looking at in the future.

For example, many of the planning and operation decisions that Hydro faces have a familiar ring to me. Railways and telecommunications in particular--with which I am more familiar--like electric utilities, face questions about how to charge for lines and routes that are costly to serve; how to get the most benefit out of existing plant; load management; and how to provide service at the least cost while meeting the needs of a very wide range of customers, from individual Canadians to large, giant industries.

Ontario Hydro is now in the process of planning for future energy needs into the 1990s and beyond. Added emphasis in our long-term planning will be given to demand management for Ontario Hydro and for the province.

I would like to share with you some of the key issues in effectively implementing programs to influence the demand for electricity. I use the words "influence the demand for electricity" advisedly. The term "demand management program" has gained a niche for itself amongst utilities, but there is something about the concept of managing demand that can be a bit misleading.

It is energy users, not the utility, who ultimately determine demand. We can strive to influence customer choices, but influencing is not the same as controlling; only the government has the power of control. A corporation can dream up all kinds of ways to make its services more attractive and efficient, but unless those ideas are accepted in the real world, you have not achieved very much.

The question facing a utility is how to gain acceptance for measures that would introduce greater efficiency to the electricity system. In my experience, you cannot divorce efficiency of use from customer satisfaction. There are lots of examples of that. A hotel can offer special rates or services to encourage weekend or off-peak travel. That does not mean travellers will accept it, nor should they if they really want to or need to travel in peak times. Telephone companies offer multiparty service at very low rates; hardly anyone will subscribe to it. Personal privacy is more important than price in that instance.

Are electricity users any different? I do not know yet, but I think not. They are individuals, and they do not always act in what somebody else might think is their own best interest. They are bound to have their own version of what is their best interest.

People do not always value energy efficiency above all else. I suppose everybody in this room is more conscious of the efficient use of energy than is the general public. I also bet a lot of us have a frost-free refrigerator; it is much less energy-efficient than the kind you have to defrost manually. Frost-free models use 81 per cent more electricity, and yet they continue to be far and away the most popular among customers.

The point is that programs requiring participation by the customer mean those customers will have to not only see the benefit but also value it enough to take action. That is why, in my opinion, customer satisfaction must be central in designing any effective demand management program.

Another area we will have to take a long, hard look at is customer equity. From the demand option point of view, customer equity means that individual customers' needs should be met without undue expense to all other customers. That sounds straightforward enough, but what happens if Hydro could offer conservation programs which rewarded those customers who conserved but caused higher rates for those who did not? I am not sure we have to regard customer equity as sacred. Certainly, there is a lot of cross-subsidization in the telephone industry. We should take a long, hard look at what is both effective and fair.

There is another key element at work here, and that is public acceptability. Regardless of the specific benefits a program may bring to electricity customers or the economy as a whole, there has to be a strong foundation of public support.

Even those of us who were outside the electricity industry until a few weeks ago are aware of the rough ride that time-of-use rates have received. For years Ontario Hydro has wanted to implement some form of time-of-use

rates. Most customers agree the principle behind the idea is a good one. Time-of-use rates would shift load off peak, and that would make for more efficient use of the province's electricity system and reduce costs overall. However, because rate restructuring might increase electricity costs for some customers, we have been unable to secure customer acceptance for what is basically a good idea. This is not unique to the electricity utilities; telephone companies have experienced the same reluctance.

I also think it is reasonable and proper to take a broad perspective on resource conservation. Surely it is more important to conserve resources which are in scarce supply than those which are more abundant. I would like our Hydro strategy to reflect that.

Any strategy should offer enough flexibility to accommodate changing conditions. What has recently happened to oil prices can only remind us of how rapidly and extensively change can take place in the energy marketplace. I want electricity's traditional role as a reliable and stably priced form of energy to continue. To do that, Hydro has to be able to react to the marketplace, to supply surpluses or shortfalls, and to customers' choices.

I have briefly mentioned some of the issues an Ontario Hydro demand strategy should address. It is not a complete shopping list by any means, but those are some of the key elements that caught my attention right away. It is quite clear that pursuing demand management or influencing demand would mean some tradeoffs. You will be hearing more details about this from my colleagues, about supply as well as demand options. They will give you many more specifics than I can on the issues. I very much hope you will participate with us to offer your views and advice, so that the programs we will be developing are as comprehensive, effective and fair as we can possibly make them.

I have one last thought. You will realize I have much broader interests than those expressed in my remarks of the last few minutes. I am interested in an efficient organization, strict cost control, a customer-oriented company and one that is sensitive to the environmental concerns. I intend to devote all my time and energy to keeping Ontario Hydro serving the needs of this great province.

Mr. Chairman: Thank you. Members of the committee, perhaps we might pause at this point and pose some questions before we get too far down the road.

Mr. Cureatz: I was interested in the comments on the oil pricing situation amd how you feel comfortable that, with the abundant supply of electricity we currently have and the anticipated completion of Darlington, it ensures a ready supply of power for Ontario. I am not exactly clear in my mind about that in relation to oil pricing. Were you saying basically that we are not subject to outside, foreign interests?

10:20 a.m.

Mr. Campbell: I think there are advantages from several dimensions. The general shift away from oil for generating electricity in the world has been a great benefit. For example, the world was using up its oil reserves far too rapidly, and no oil would have been left for our children or future generations if we had gone on at the rate we were going in the 1960s and 1970s. The oil embargoes, while they were difficult at the time, may historically have been a good thing. They shook us up from our complacency, and we shifted away from oil.

As a result, I mentioned that one of the chief factors pushing down the price of oil is that it is no longer needed in a massive way to produce electricity. That will be good for the world economy. I am not one of these people who says: "In theory, electricity competes with oil and gas. Therefore, those prices should be high."

By the way, the gas companies are very shortsighted when they advocate that electricity prices should be high. If our electricity prices went as high as they would like and have advocated--such as the Ontario Economic Council saying 65 per cent increases--they might sell a few more gas furnaces. They can already beat us on price on gas furnaces, if they want. That would devastate our industrial base, and they would end up selling less gas. It is very shortsighted.

I take the opposite point of view. The lower gas and oil prices are, the better it is for the economy and for the people. When the economy does well, our utilities do well. Ironically, the drop in oil prices will mean we will need more electricity here, because we will have more industrial activity. Our automobile industry will be going great guns. We will be building that great new plant in Oshawa, all those other plants will be coming on stream, and people will be working. When they do that, they consume more electricity.

These things are not either/or propositions, but it is important to understand the relationship they have.

Mr. Cureatz: I appreciate that.

Mrs. Grier: I would like to ask Mr. Franklin to expand a bit. I was very pleased to hear him make a fairly clear distinction between what the utility could do with respect to influencing demand, its limitations, and the role of government or a regulatory agency. Having accepted that, at what point in a demand-supply study does he see the government or the regulatory agency impinging?

Mr. Franklin: A utility can do its very best to make its services more attractive, shifting off load or whatever. As I said earlier, that is all we can really do. We can encourage or influence people to move in the direction we want them to move. We cannot order them to do so. We cannot demand that they do so.

In the scheme of things in about seven months' time, as the chairman has mentioned, we will be coming out with a preliminary report which will be distributed widely to the public, to regulators and to the government. There will be ample time at that time for them to make their views and influences known about the probable success of influencing customers and whether they want to take some other action. It is out of our hands at that stage.

Mrs. Grier: Is that probable success not to some degree dependent upon the policy framework within which the plan is prepared, a public policy as opposed to a utility policy?

Mr. Franklin: I do not quite catch the sense of your question.

Mrs. Grier: If you are doing the type of study that you are contemplating in an atmosphere where conservation is not seen to be important, then is your study not going to come to one conclusion; whereas, if you embark on the study having had a very clear message that, "Yes, we think conservation is important and ought to be a public priority," then your study may come to quite different conclusions,

Mr. Franklin: Do you mean if the government were to pronounce that?

Mrs. Grier: Given what you have said about the limitations on the utility itself to encourage something such as conservation.

Mr. Franklin: Certainly, we will take account of the input of this committee and other public forums that we have. There are lots of proponents of conservation. It is not going to be left out of our study; that is for sure. It will have a very prominent place in it. I prefer to use the words "efficiency of supply and demand" rather than "conservation." As the chairman said, conservation for conservation's sake is not necessarily correct; it is the wiser and more efficient use of the system that is correct. I would not want anyone to think we would leave out that element in our study; it is a very important element of our study.

Mrs. Grier: What do you see the role of the select committee as being in that study?

Mr. Franklin: I am the wrong one to ask about the role of the select committee. It is my first appearance here. I do not know the degree of influence you have on all members of the public whom you serve. Certainly, we want to incorporate your views. You represent a wide cross-section of the population and we are interested in those views.

Mrs. Grier: What degree of influence do you think we should have on Ontario Hydro?

Mr. Franklin: You have quite a bit of influence on Ontario Hydro. We take very seriously the recommendations you make and the positions you take. The ultimate role, the direction for Ontario Hydro, rests with the government, as I understand it. It is the representative of the shareholders and stakeholders. The members individually and the committee generally have the reputation of having quite an impact. I suspect this study we are doing now on the demand-supply side will not be different and you will exercise your influence in the very many ways that you have done in the past.

Mr. Cureatz: We touched base on this yesterday. We talked about the program, the $8-million or $16-million study--whatever the figure was--about taking a community and doing that type of conservation study. Mr. Franklin, I suppose you are not familiar with that type of brief, but in a nutshell, a community in the northwestern United States was taken as an example to do an intensive study on conservation and it cost, I think, $8 million. That seemed to be the figure.

Mr. Charlton: It was $20 million--$8 million and $12 million.

Mr. Cureatz: Was that the breakdown? We are not going to be bantering around millions of dollars this morning, but you would probably feel a little uncomfortable in going that route at the moment.

Mr. Franklin: I am not in a position to answer that question. I am not familiar with the study you are talking about. A similar study was done in the telephone industry in Manitoba. I do not think they learned an awful lot new, but some of the things they suspected were reinforced by it, some of the things I mentioned in my opening remarks about the use of multiparty service.

Mr. Campbell: We have had a study of several million dollars going on with respect to time-of-use rates and so forth in several communities.

Oshawa is the current one, with 500 households. I am not familiar with the proposal of yesterday, but I suspect that would have some parallel to it.

Mr. Cureatz: What made it attractive for me was that they took a community to atudy, and there is nothing like taking a whole little community and doing an intensive study. I am familiar with the Oshawa one.

Mr. Charlton: They did it for a total community.

Mrs. Grier: It was a study of the acceptability of efficiency. They found 92 per cent--

Mr. Cureatz: And doing the efficiency study, as Mr. Charlton said. Is that right? They actually did the efficiency manipulation by going into each household? The households participated.

Mr. Charlton: They went into the households, did energy audits, retrofitted houses, changed appliances and so on.

Interjection: Who paid for it?

Mr. Charlton: The utility. Bonneville Power Administration.

Mr. Ashe: The consumer of the product.

Mrs. Grier: Mr. Franklin, in your remarks you very carefully talked about the customers" Mr. Campbell began by pointing out to us that Ontario Hydro had no shareholders, but in fact the people of Ontario were the clientele the utility served. I see a distinction between your customers and the public generally. Is there any significance in your being careful in your phrasing and talking only about the customers and Mr. Campbell somewhat interchangeably using "the population of the province" as opposed to the "electricity users"?

10:30 a.m.

Mr. Campbell: To clarify what I said, Mrs. Grier, the distinction I was trying to draw is that we are not like most of the US utilities which have customers who want a return on their investment. We do not have shareholders in that sense but we have shareholders in every resident of Ontario, in effect, who are de facto shareholders. Since we provide power at cost, instead of having profits which we pay out to our shareholders, as a private utility would do, our dividends are paid through the low-cost rates to our shareholders who own us and are also our customers. I was making that distinction.

Mrs. Grier: Do you see your primary responsibility as being to your ratepayers?

Mr. Campbell: Yes. If we were a private utility which had shareholders, we might have a different agenda from that of our ratepayers because we might want to maximize our profit for a narrow group of shareholders; whereas, since all our ratepayers, in effect, are shareholders, we try to make our interest exactly the same as what we feel our customers want. They are our shareholders and they are the people who get our dividends. That is the distinction I was trying to make.

Mrs. Grier: I have one final question of Mr. Franklin. I went along with your analogy with respect to the Canadian National to a certain point,

but would you not agree it is never likely to be in the interests of CN to attempt to persuade its customers not to use CN but to use some other method of transportation, whereas it might be in the interests of the public to see a utility user--

Interjection.

Mrs. Grier: Not as an admitted policy, but to persuade a utility user he is better off with some other means?

Mr. Campbell: They pawned them all off on Via.

Mr. Franklin: The chairman is baiting me and I will not rise to that bait. You are thinking of CN in its probably most visible role as a transportation company, but CN has many roles.

Mrs. Grier: I was making the distinction of its perhaps being in the general interest of the public at large to persuade people not to use electricity for a certain use but some other form of energy, whereas I could not see a transportation utility persuading me it is better to fly than use rail.

Mr. Franklin: As I said in my remarks, there is probably a closer analogy between Ontario Hydro and the telecommunications side of life. CN is very much in the telecommunications industry, where I spent 24 of my 30 years with CN, and I think there is an analogy there. The telephone companies have pioneered time-of-use rates, trying to get loads shifted off peak times. They have tried to encourage better utilization of their plant through multiparty service, two-party service, which has fallen flat.

They have talked about introducing the per call concept for local calls to bring discipline to the teenagers of our world, of which I can speak because I have two. They have tried a lot of that, and every time they have tried some of those things, they have met customer resistance because when somebody's rate is going down, somebody else's is going up. From my experience with CN, I think there is quite a good analogy between the telephone companies and utilities. If I thought long and hard enough about it, I could probably even find some on the transportation side, but I will not admit it is to shift passenger services away from the railway.

Mr. Chairman: Mr. Franklin, in response to one of Mrs. Grier's questions, you suggested Ontario Hydro should be able to react to its customers, which I think is quite an appropriate statement for a business such as Hydro, which is a service, customer-oriented business. I guess you are talking about flexibility, being able to roll with the changes in customers' demands and the expectations they have of the utility. How do you see Hydro best achieving that kind of flexibility?

Mr. Franklin: I should take a minute to explain my preoccupation with the customer. CN is closer to the private sector than Ontario Hydro is. Virtually everything it does, except perhaps in the telephone industry, is in the competitive side of life and it keeps its customers by keeping them happy. I have grown up with that over 30 years and so I have a preoccupation with it. I really believe we are not in business to make money. No company is. It is not in business to do anything except serve its customers. It has to make money to stay in business. That is a prerequisite, but that is not why it is in business. It is in business to serve an identified need of its customers.

I guess I have a heightened sense of that, being sensitive to some of the things the chairman of Ontario Hydro has talked about: making sure that you do not push something on your customers that is inefficient simply to sell a load, that you take their requirements into account, and that the application you are putting forward is more in their interest than the form of energy they are using. It takes a proactive kind of marketing, but I think if you hold out the customer as your ultimate grail, then you will succeed.

That requires you to keep open not only the demand influences you have but also the supply influences, so that you can have flexibility and meet the shifting demands of those customers. As you know, our customers range from individual pensioners to very large conglomerate companies and we have to be able to serve that full range. That requires a great deal of flexibility and I think it also entails a mentality, an attitude of recognizing that each and every customer is important.

Mr. Chairman: You talk about flexibility on the supply side. How do you see Hydro's role in that instance? Is it one of having lots to spare or is it one of having diversity or flexibility of supply?

Mr. Franklin: It is all those things. I do not think we should close off any options. The chairman of Ontario Hydro has said reliability is the most important thing we have, for our present industry and for future industry to locate here. I think he is right when he says we would never be forgiven if we jeopardized reliability of supply, and that includes the person living at home and the plants he talked about in Oshawa. If we have to err, I would say it should be on the side of having more supply rather than less. You have to control that, you have keep it within margins, but personally I think we would be more easily forgiven for having more than for having inadequate supply.

Mr. Haggerty: I was interested in Mr. Campbell's comments when he talked about pleading for reliability and the shortsightedness of completing Darlington. We seem to be back at Darlington more than ever. You discussed the world price of oil coming down considerably in the last six months. When will it be it feasible or economical to bring your oil-fired plants back into operation? What are we looking at for the price of oil?

Mr. Campbell: Mr. Niitenberg, our executive vice-president in charge of operations, is here. Arvo, what price would make that feasible?

Mr. Niitenberg: When the decision was made to build the Lennox station, oil was $1.90 a barrel and it was economical at that stage. Our present plans call for Lennox to be incorporated into the operating system by the mid-1990s as a peaking station. Fuel price in the range that it is right now is not the determining factor. It is still much more expensive than coal.

Mr. Haggerty: Is it much more expensive, even today?

Mr. Niitenberg: Yes.

Mr. Haggerty: The price of coal has increased considerably too, from 20 or 25 years ago when you were forecasting oil at $1.90 a barrel. With the price of coal as high as it is, it is still not feasible to bring the plant back into production.

Mr. Niitenberg: Yes, that is the situation today.

Mr. Haggerty: Why would you say that in 1990 you would use it as a standby?

Mr. Niitenberg: We need peaking capacity in the 1990s. When you use a plant for peaking, the fuel cost becomes less important in relative terms because you are operating it for only a limited number of hours per year. If you were producing electrical energy continuously, you would be burning an inordinate amount of fuel, which would then be the major cost.

10:40 a.m.

Mr. Haggerty: However, we still have problems in the nuclear industry today. The Pickering plant is still shut down. You have problems at Douglas Point where the A station has been giving you some problems over the years. You have outages there. We are looking at 800 or 900, maybe 1,200 or 1,300, megawatts.

Mr. Niitenberg: I do not know how you figured that part, but right now in the operating system we have 14 commercial-size nuclear units and three of them are down for maintenance; two Pickering units for retubing and a Bruce nuclear generating station unit. Statistically, if you get 80 per cent availability with 14 units, you expect to have 2.8 units out of service at any given time. Some days we have zero out of service for maintenance and other days we have more than that.

Mr. Haggerty: With these outages I am talking about at the Pickering and Bruce plants, we are not looking at normal shutdowns to do general maintenance to the generating plant itself; we are looking at long-term outages. Pickering has been out for two or three years now and this is costly.

Mr. Niitenberg: We are looking at rehabilitation. The answer is yes, it is costly. However, it will increase the life of the plant and we will still be getting low-cost energy out of it.

Mr. Haggerty: It may be increasing the life of the plant, but it is costing us money today because it is on borrowed money. To have a plant shut down is the same thing as if I went out to buy a new car and had problems with it. If it has been in and out of the garage for six months at a time--I think I am using the phrase that you people use--the cost of that car will go up because I am not getting the mileage out of it.

Mr. Campbell: Just to put it in context, the new issue of the Economist has an article on nuclear power. The Economist, by the way, is the publication that, at the height of the oil crisis, predicted that in four years' time there would be an oil glut on the market. If you had believed it then, you could have been rich. It is advocating now, while oil prices are low, that the world has a breathing space to build more nuclear plants. It is using as one of the pluses that nuclear plants are achieving up to 70 per cent average load factors. The German gentleman whom I quoted said that Germany is looking forward to achieving 80 per cent with its nuclear reactors. Our reactors have often operated in the 90, 95 and 98 per cent range.

Mr. Haggerty: At times.

Mr. Campbell: In comparison with all the others in the world, ours are at the top. We are going to have some outages, but if you look at the lifetime use, ours still lead the world. The point is that the Economist is still advocating that as a sensible investment, even at a 70 per cent capacity, which means that out of 10, three would be out of service all the time.

Mr. Haggerty: You drew a comparison with Hydro-Québec, too. You said you had a shortfall of power coming through from Quebec and suggested that, in comparison, nuclear was still the way to go. Why would you not draw a comparison with Sir Adam Beck generating station and find out the outages that have occurred there in the past 20 or 25 years? They are very minimal and not that costly.

Mr. Campbell: If we had another Niagara Falls, that is what we would want to develop.

Mr. Haggerty: You have had about 500 megawatts sitting there idle over the years. All you had to do was to look at the forecasts and say, "Maybe we should reconstruct that plant."

Mr. Campbell: That is in our plan. We are doing that.

Mr. Haggerty: I was surprised when you said you would be bringing the oil-fired plants back on in the 1990s.

Mr. Niitenberg: As a reference plan, that is when we expect it back in peaking service.

Mr. Haggerty: I find it difficult to follow your planning and your future outlook on the generation program in Ontario. Your comment was not to look to purchase energy from Manitoba or Quebec because that is not reliable.

Mr. Campbell: I would not knock that. Personally I am hoping we can sign long-term contracts with both Quebec and Manitoba, but let us not depend on one solution to a complicated problem. That may be part of the solution.

If we go back to the Lennox plant, that was built when oil was less than $2 a barrel. We were to have long-term contracts. No one predicted what was going to happen to oil prices. That plant is not economically feasible now. However, after Darlington is complete and our growth continues, we are still going to need peaking plants. We have a plant that is already built and the capital is sunk into it. We can bring it on for 10 or 15 per cent of the time even though the oil might be more expensive. We would not use it as a full-time, base-load plant, but for peaking purposes we already have the plant sitting there.

Mr. Haggerty: That is right. It costs us money sitting there.

Mr. Campbell: It makes sense to use it as a peaking plant. That is our plan.

Mr. Haggerty: The price of oil is probably going to go below the $9 that has been set in England now. That is in American dollars, so you are looking at oil at about $3.50 a barrel.

Mr. Campbell: When you consider the United States, with all its cancellation of nuclear plants, there are still between 80 and 90 under construction. That is going to continue the downward pressure on oil prices, so I would not invest in oil futures unless I shorted them.

Mr. Haggerty: If you were to take a look, you can probably buy oil for less than $10 a barrel right now. The other good thing about it is you could shut down one of your coal plants and we would not have the problems of acid rain. If you weigh in that factor, maybe you are better to go in that direction.

Mr. Campbell: If we come to the point of installing scrubbers on our coal plants, we would have to weigh that option. The cost of operating it would depend on the cost of oil and gas. Again, there are no simple solutions. We have gas lines into the Hearn station right now. We run that on gas and it does not produce sulphur dioxide, but it produces more nitric oxide. Information increasingly indicates nitric oxide may be the real villain in the piece; killing forests in Europe, for example. What you gain in one, you lose in another. These are all things that we have to weigh. I am not putting down the need to examine them more closely, but we have to balance the pros and cons of each.

Mr. Franklin: I understand it would take close to a year to bring it back on stream. It is fairly costly because there are a number of startup costs, training costs and what have you. You would want to be sure about the long-term future of oil prices. I still feel a little uncomfortable about their fluctuation, and I am not quite sure where they are going to end.

Mr. Campbell: The test is, you cannot sign long-term contracts at those prices. You can buy a few barrels on the spot market, but if you are going to plan a plant, you have to have long-term contracts.

Mr. Haggerty: You can handle about three or four months' supply of oil in holding tanks, can you not? If the oil is that cheap, you do not have to start them all up. You could start up one or two instead of going the whole way with the four units.

Mr. Franklin: My only point was that you would not want to do that and then find out six months later the price of oil has gone back up past your threshold point again. You want to have some reliability of price.

Mr. Campbell: There is a human element in it as well. We would have to staff up that plant and train the operators. It takes about a year to do that. We cannot just turn people on and off like switches. We have to consider the people we are dealing with there.

Mr. Haggerty: I am concerned that you are going to put all your baskets in one generation program, and that is nuclear. You will have about 60 per cent in it before long if you get Darlington on stream.

10:50 a.m.

Mr. Campbell: It will not be all in one basket in this sense: we will still have our reserve capacity; we will still have our coal plants and our oil plant in reserve. That is the ideal way to have those kinds of plants, because they are the polluting plants and the most expensive. You have them there for emergencies but you try not to use them.

Mr. Haggerty: I do not know. The numbers do not seem to come out right. You have the oil-fired plants there now and what has taken place in the past--

Mr. Campbell: Let me give an example. We have the Lakeview thermal generating station. When Darlington is complete, the Lakeview plant plans to reduce emissions. Since the committee met last time, there have been more stringent emission requirements placed on us by the Ministry of the Environment. We accept them and we can meet them. We plan to meet them by reducing the burning of coal. Is the Lakeview plant in your riding?

Mr. Haggerty: No.

Mrs. Grier: It blows on to my riding.

Mr. Campbell: I have good news for you. We plan to reduce that plant to run only about 10 per cent of the time.

Mrs. Grier: I would rather put the scrubbers on it.

Mr. Campbell: It will be shut down in the spring, summer and fall, and will be brought on only in the coldest part of the winter, approximately 10 per cent of the time. That means that 90 per cent of the emissions are eliminated and that is better than any scrubber. It produces no nitric oxide. You cannot scrub nitric oxide. That is the plan we have and it is good for the environment and the community. The plant will still be there and it will still be staffed, but we will save money on the coal that we are not burning. In an emergency, it will be there if we need it.

Mr. Ashe: I would like to carry on a debate with Mr. Franklin about the railway initiatives in passenger services over the past 30 years, but I am not sure whether that would be very constructive for this committee.

Mr. Campbell: I am bitter about that too, because both my father and my brother were railway conductors. It was a different railway, though.

Mr. Ashe: I think they are both in cahoots on that issue. In any event, I will go to Mr. Campbell. Today we will take it easy on Mr. Franklin.

You spoke on Ontario Hydro's involvement in the Energuide program in testing and putting out the evaluations on appliances, etc. and made reference to Hydro's activities in the development of more efficient heat pumps. Can you expand slightly on that?

Were any or all of these Hydro initiatives? On what basis were there contractual arrangements with, for example, the Department of Consumer and Corporate Affairs in Ottawa? If there is a contractual arrangement with that department, is that the line the government is threatening to withdraw or is it just the actual production of the stickers per se? Do you have some feel for the cost? It all rolls into the one thing. Then I have another question on a different subject.

Mr. Campbell: It was a federal program of several million dollars. Since we have a research facility which is the most advanced in Canada, we did the actual testing on behalf of the federal government. Many of those appliances are made here. We did the testing and set the standards under contract with it.

The key thing is that the federal legislation required the manufacturers to use those standards as a consumer protection mechanism. About four or five months ago in Ottawa, they announced they were going to cut out that program as a cost-cutting measure. We have protested to the federal government. We hope members of this committee and the government can help us on that, because we think it is a very shortsighted policy.

As I understand it, the federal government will withdraw the legislation. In other words, it will no longer be a requirement. I assume somebody probably thought, "Since our appliances are already efficient, there is no need for this any more." The problem is that once you take away the

legislative requirement to have those stickers and those standards, you can get flooded by all sorts of junk--pardon the expression--from other areas. That is what we are concerned about. It costs more to make a more efficient appliance. If you remove those standards, there will be a temptation to cut corners and you will lose in efficiency.

As to your question about the heat pump, we particularly developed that heat pump. It was Ontario Hydro's initiative for the northern climate and has been very successful. It has been licensed and is being manufactured. It is being exported around the world now by Ontario manufacturers that have benefited from it. At one time it was held that air heat pumps were only effective in the mid latitudes of the United States. Since the development of a more efficient unit, they now are effective and are catching on quite rapidly in our climate.

That is one of my favourite examples because I think it is the closest thing you will ever get to a perpetual motion machine. It actually produces 130 per cent or 140 per cent more energy than is put into it. There are few other places in the world where you can find that efficiency. They also have the advantage of providing year-around air conditioning.

They normally require some supplemental heating because when the temperature drops very low, although they will still work, the efficiency drops. They are best used in a combined system where you have some other fuel--propane, gas or whatever.

A manufacturer in Niagara Falls has produced a model. I forget the tradename. It is the most efficient one to date. It uses natural gas in very cold temperatures and for the rest of the year it uses heat pump and electricity. It is a very desirable addition to a house. It almost eliminates the spot for the furnace. I understand he mounts it in the wall, half inside and half outside, and it gives more space in the basement.

Mr. Ashe: Has the Energuide program been a cost-recovery program for Ontario Hydro?

Mr. Campbell: We were paid by the federal government to do the laboratory work.

Mr. Ashe: It has been roughly cost recovery.

Mr. Campbell: Yes.

Mr. Ashe: This is on a completely different subject. On the demand-supply options study that now is under way, phase 1 is over and you are in phase 2. You indicate it will be another year and a half. I know the answer, "It is long and complicated." I do not want that answer. Why does it take so long? If you were told tomorrow that you had to have that study completed before the end of 1986, utilizing only your present resources, could it still be done in a responsible fashion?

Mr. Campbell: We will have an interim report within seven months. That will have a lot of the data. From there on a lot of the process is consultation with the public, the government and various groups. That is kind of out of our hands. However, a large part of our work will be completed within seven months. The reason for the slippage is that the staff that has been working on the requirements for this committee has literally had to down tools on that job to do this job. We are anticipating that when this committee

completes its activities those people can go back to finish that job, and then maybe we will come back again.

Mr. Ashe: As you have a long list, Mr. Chairman, I will let you move on.

Mr. Snell: Mr. Campbell, is it Ontario Hydro's intention to review what is going on in phase 2 of the DSOS, the demand-supply options study, during these hearings?

Mr. Campbell: I will ask Mr. McConnell to deal with that.

Mr. McConnell: I am not sure I understood your question clearly. Was it, is it our intent to review phase 2?

Mr. Snell: Yes, the things being looked at in phase 2 of the DSOS. I gathered from Mr. Campbell's comments that it is not, given that an interim report is coming in six or seven months, and that this would be when the issues being looked at would be reviewed for public consultation.

11 a.m.

Mr. McConnell: One of the reasons this study is taking so long is that the process we are following is seeking a great deal of public input to help us with the tradeoffs. During the course of today and tomorrow, we will be making presentations as to how we will be going about getting public input. Of course, part of the input we will be getting will be what we learned from the select committee on energy.

If you are asking, "Would it be an advantage to us to have input from the select committee after we have developed our report?" the answer is clearly yes. We would welcome having the select committee review our recommendations after we have prepared them, if the select committee is still in place and wants to do so.

Mr. Snell: Then it is clear that you are not going to review what you are dealing with in phase 2. You did not answer the question directly as to whether we are reviewing what has been presented from phase 1 in the review of individual options or whether you are going to deal with specific packages of resources.

Mr. McConnell: I am sorry. I misunderstood your question. We will be reviewing what we have in phase 1, and we are seeking input that would contribute to our phase 2. We do not have any recommendations at this time to put forward that arise from phase 2.

Mr. Snell: We appreciate very well that you do not have recommendations, but the committee is interested in what kinds of issues you are battling with in phase 2. Considering Mr. Campbell's remarks earlier that the DSOS is "a framework for decision-making in the future and not a plan itself," I am at a loss as to why information has not been available to the committee and will not be made available to the committee in the next two days as to what you are looking at in phase 2. If it is just a framework, then what is the problem?

Mr. McConnell: We have not developed the framework. We are still in the position of listening. We are trying to find out what the views of people are and we have no conclusions at this stage. As Mr. Franklin said, we are

interested in the views and we have not obtained all those views yet. We are still in the process of consultation, but we will be identifying issues.

Mr. Campbell: Perhaps you can wait until our presentation in the next couple of days and then think about your question, I think all of it will be dealt with in the next couple of days.

Mr. Charlton: Perhaps we can go back to the point Mr. Snell just raised. I am having some difficulty with Mr. Campbell's comment that DSOS is somewhat behind schedule, in part because of preparation for this committee. This committee made it clear some months ago that what it was going to be looking at in this phase of its hearings was DSOS. It seems to me it would have been much more compatible if in your preparation for these hearings, DSOS had proceeded full steam ahead as opposed to setting it aside to prepare for this committee, which is looking at DSOS.

Mr. Campbell: Our people have been working very hard. They have been working weekends, including over the Easter weekend and whatever. A lot of work has to be done.

Mr. Charlton: I understand that, but when we are supposed to be doing a review of the demand-supply options study, why was the work not in preparation for this committee and for these hearings work on DSOS?

Mr. Campbell: We have made it very clear from the beginning that our timetable was not going to put us in a position to give you the kind of advanced data we will have six or seven months from now.

Mr. Charlton: That is not the point I am trying to make, Mr. Campbell. My point is that you said a couple of times DSOS was set back six or seven months because of work your staff had to do for this committee, and that they were the people who were working on DSOS. I can understand that in the context of the hearings in October when we were doing something very specific--looking at Darlington--but since that time, and especially for the past three months, it has been clear that this spring we intended to review your work on the demand-supply options study.

Mr. Campbell: I plead for you to look at the presentation in the next couple of days. Maybe we are not as far apart as it appears. What we will be laying out in the next couple of days as a framework will address many of the questions that are on your mind. We may not have the data to fill in a lot of those questions but the framework we lay out in the next few days will be--

Mr. Charlton: We all understand that we are not going to get all the final answers DSOS may reach. Realistically, the focus of this committee is to look at how you are approaching the study and what it is you are looking at.

Mr. Campbell: That is not a problem.

Mr. Charlton: I do not see how that could have held up the process. Let us set that aside. We will see what comes out over the next two days. We can comment further.

A number of things were mentioned in Mr. Franklin's comments and in yours, Mr. Campbell, that I would like to raise. I will direct them to you, but Mr. Franklin should not feel shy about responding if he wishes to do so.

I am going back to the issue Mrs. Grier raised, Ontario Hydro's

inability to regulate outside itself in the society, but that the government has the ability to regulate. We heard repeatedly last fall and again today that Hydro's ability to influence certain aspects of demand is limited. We understand that. On the other hand, we are a committee of the Legislature that is going to be making recommendations to the government, which is the regulator.

You mentioned the successes on the one hand and the potential problems on the other of losing the Energuide program. I am not going to dispute that the Energuide program was successful. It was successful to the extent that nonregulation, only information, can provide success.

On the other hand, I think you will agree that the government's ability to set standards for appliances--you said your staff has the expertise and did reviews of the appliances. We keep hearing repeatedly from Hydro that in terms of conservation and efficiency its ability to influence consumer preference is limited. When are we going to see a list from Hydro both of what is possible in appliance standards and what is in Ontario's best interests in standard regulations around this province? Can you start fighting that battle?

Mr. Campbell: In terms of the Energuide program, we have made strong representations to the federal government and have asked for support from the provincial government.

Mr. Charlton: The Energuide program was good, but not good enough. We need standards in law that will take us the next step. Since your people reviewed the efficiency of appliances, it would be helpful to see documentation of that and recommendations from Hydro as to what would be a useful approach to regulations in this province, in law, that set standards for appliance efficiency.

Mr. Campbell: That is the kind of thing we will do as we develop our conservation-cum-efficiency part of this. We believe a lot can be achieved through conservation. We are counting on 3,000 megawatts, which is equal to Darlington, in conservation. That is built into our plan. We may have as much as another 1,000 megawatts to 4,000 megawatts in conservation, which could be a second Darlington plant. We believe we can count on the first with existing incentives. The second may take more incentives. We will be spelling that out in our demand-supply study.

11:10 a.m.

Mr. Charlton: We want to help achieve the second 4,000 megawatts. What we want ultimately from Hydro are clear statements of how we can go about getting what you cannot do on your own.

Mr. Campbell: It may be a combination. It may be a question of legislation; that is one approach. Another approach is that it may require financial incentives.

Mr. Charlton: Financial incentives are something that are going to have to be approved at our end. Those are the kinds of things we want to hear and see.

Mr. Campbell: This is the kind of data I mentioned. We have the concepts, but we still lack this data in terms of presentation.

Mr. Charlton: Let me move to some of the other things that were

raised. You raised the fact that on a number of days during the latter part of our deliberations last fall and during the course of the winter, Ontario suffered shortages. We were suffering shortages in the winter of 1985-86 and we are likely to suffer some shortages again in 1986-87. At the same time, you have advertisements promoting the use of baseboard heaters to eliminate cold floors. Why are those ads still running when you know that because you have no new capacity coming on this year, any additional switching that goes on this year is likely to increase those shortages, and therefore is likely to put you in the position of having to purchase greater amounts of power--expensive power, as you put it--from Michigan?

Mr. Campbell: I think we have been through this before. We believe it is not inconsistent to promote the more efficient uses of energy to do the kinds of things that are customary wants.

Mr. Charlton: I do not want to have that argument again. We obviously disagree on that part of it. The question is very specific. You know you have a problem right now. You have two units down at Pickering. You know you have shortages on at least certain days in the winter as a result of the level our system is at. Whether you and I agree or disagree that baseboard heating is an efficient use of electricity in the long run, in the short run you have a particular situation to deal with, at least until the first units of Darlington come on two years from now. Why are you continuing to promote that additional use when you know it is going to create some additional shortages?

Mr. Campbell: Most of the time and on average, additional use is beneficial to all our customers. While we have had shortages on some days, the most efficient way to run any kind of plant is to shave off the peaks, fill in the valleys and run the plant at capacity. Everyone gets a lower unit cost as a result of that. If our power sales fall, that means our rates have to go up.

Mr. Charlton: No one is talking about your power sales falling.

Mr. Snell: Do baseboards not add to the peak?

Mr. Campbell: Not necessarily.

Mr. Charlton: Are they not going to add to the peak on the coldest days?

Mr. Campbell: There is a time-of-day element in those as well.

Mr. Charlton: We have two kinds of peaks, as we have discussed with you and as you promoted to us over and over again. We have daily peaks and we have seasonal peaks. The bottom line is that the problem you had this winter was a seasonal peak, not a daily peak.

Mr. Campbell: No, it was a daily peak in--

Mr. Charlton: It was because of the season of the year. If it had not been winter, you would not have had daily peaks on those days, would you? That is part of the seasonal peak. It is true enough that there was a daily peak because of an extremely cold temperature on those days, but it happened repeatedly over the course of this winter. It did not happen once on one coldest day; it happened in a season. It is a seasonal problem that winter presents. It seems to me it is not exactly the best approach to planning, when you know you have no more capacity to add and you know you have had

shortages--you raise that as an issue here--to be promoting the use of additional power that is going to affect that period of time again next year to a greater extent.

Mr. Niitenberg: I think there is some confusion on the capacity question. There is also a philosophical difference. I would like to deal with the capacity question first. We did bring Pickering A into service. It was not in full service at the time we were looking at our system problem and new system peak. Second, by the winter coming up we expect one other Pickering retubed unit to come back. We are looking to both of them being in service in the first quarter of 1987, so we are really adding three units in the time frame you are talking about.

Mr. Charlton: In that respect, how long is it going to take before we know what the impact of this past week's events at Bruce is going to be on the system for the rest of this year and in the future?

Mr. Niitenberg: It could be weeks. I could deal with events of the Bruce situation to put the facts on record as they are right now, but I will come back to that baseboard heating question.

If a customer has a cold area which is uncomfortable, I can relate that to my own three-bedroom, standard subdivision home. One of the bedrooms is over a garage and it is cold. I have insulated the ceiling of the garage and that is covered up, but it is still cold. I have two options. I can either turn my furnace up and compensate to get heat into that room by running the average of the house warmer, or I can put in supplementary heating. My most efficient supplementary heating is a baseboard heater in that room, which I use when I use the room.

Mr. Sargent: John White said to put a sweater on.

Mr. Nittenberg: I put a sweater on too. A lot of it is the lifestyle the person wants and also whether you are strictly conserving electricity or you have a broader concern and say we should conserve all energy. I firmly believe I am conserving all forms of energy. Unfortunately, from your perspective, I use a baseboard heater, and thereby I use more electricity. I am not ashamed of it because it adds to overall efficiency of use of energy, and it certainly adds to the comfort of my family.

Mr. Campbell: Philosophically, we believe Ontario Hydro was founded to improve the quality of life of the people of Ontario, and it has done that in spades. I was raised in a place that did not have electricity. I watched my mother wash clothes with a washboard. We heated with a wood stove and we had a pump outside. That was true for many people in Ontario.

I believe Ontario Hydro was founded to bring people a better quality of life and that is certainly what our customers tell us they want. We do not think it is a bad thing if our customers want to improve their quality of life by using electricity. We think it is a renewable form of energy in the form we use it and it is better for the environment than most other forms of energy.

Mr. Charlton: We have been through this debate a number of times and I know what your position is. I accept that as your position. What I am saying is that we are hearing you come in here and tell us about the shortages you had last winter at the same time as you are promoting the shortages.

Mr. Campbell: We can cope with those and we have kept the system

going. I am saying that in the future, with the economic industrial growth we are going to have, we are going to continue to need plants like Darlington to match the economic growth and the new factories. Otherwise, if we turn away from that we are going to be turning our backs on Ontario as a good place to live and work. It is as simple as that.

Mr. Charlton: Perhaps you can tell us a bit about what happens.

11:20 a.m.

Mr. Campbell: To give you an example, I mentioned that we have had some discussion, which I find quite strange, about becoming less electrical-intensive. Using Norway as an example, it has similar advantages to us. It has its position in Europe, the northern part of the continent, and it has ample supplies of low-cost electricity. Norway takes that as a great advantage and is promoting the growth of the use of electricity in Norway in industry and in every other way. It wants to be a haven for industry in Europe where low-cost electricity is required.

I do not agree with the suggestion that we should be turning away from the strategy that has made Ontario the industrial centre of Canada and the best place to live in Canada. It is one of the best places to live in the world.

Mr. Snell: Your advertisements are targeted at residents, not industrial customers.

Mr. Campbell: We have both of them.

Mr. Snell: I guess Brian is referring to the residents. Correct me if I am wrong, Brian. If we are truly interested in quality of life and in customers' free choice, why do we not spend the same amount of money advertising triple glazing? If they truly have all the options available to them and you want them to make the right decision, they can triple glaze their windows or increase their electricity usage. If the quality of life is not changed, we might have trouble associating quality of life with electricity use because of other options.

Mr. Campbell: I mentioned that we invented the program of measuring heat loss from houses. It is used all over the world.

Mr. Snell: I appreciate that.

Mr. Campbell: We will do energy audits on houses and we will show people how they can save energy. We do not believe in mindlessly increasing the use of energy. Our approach is that it is a valuable resource and should be used wisely, so we can have it when we need it. We think it is good for our industrial development and we think it is equally good for the quality of life of our people. If you talk to our customers, they will tell you that.

Mr. Charlton: You mentioned the system in Norway and its approach to electrical energy intensity and its use in society. Perhaps you could tell us about the system in Norway. Are they burning coal to produce their own electrical energy?

Mr. Campbell: They have hydraulic power.

Mr. Charlton: Are they building any nuclear?

Mr. Campbell: They have a surplus of hydraulic power, more like Quebec, but our rates are comparable to theirs. We have been relatively more successful, because we have had fewer advantages and we have come up with better results for our people. That is why we still have people emigrating from Norway to Canada.

Mr. Charlton: Can you tell us a bit about the recent incident in the tubes at Bruce?

Mr. Niitenberg: I can give you an update on it, but I want to make a comment to Mr. Snell first. You mentioned insulation and double windows. Again using a very mundane and personal example, I put on storm windows in my bedroom over the garage and insulated the floor under it but that did not heat the place. It did allow me to use a smaller baseboard heater and I use it less frequently. In my opinion, the combination is still most efficient.

In response to your question on Bruce unit 2, I will take a couple of minutes to review the events. The unit was shut down on Wednesday evening of March 26 due to some problems we had with valves on the moderator ion exchange column. We also wanted to fix up some neutron flux detectors and replace a primary heat transport motor, which was part of an ongoing maintenance program. So the unit came down for an entirely different reason.

During the normal checks that we do on the reactor, we had an indication that there was a leak of heavy water in an annular space between the calandria tube and the pressure tube. The reactor at that time was off line. It was totally cooled down, and we went into a normal checking procedure of pressurizing the reactor using pumps to try to spring the leak open to detect which specific tube it was. That was done on Friday, March 28.

The pressurization of the test enlarged the leak and pinpointed it to a tube numbered N-6. It is about mid-height of the reactor and about a quarter of the way over from one of the sides. Heavy water was escaping through the pressure tube and into the moderator system. That indicated that not only had we opened up the crack in the pressure tube but also there was an opening in the calandria tube and water flowed from the pressure tube side into the calandria.

To put that in context, it flowed from one side of a containment into a tank. It was contained. Only two kilograms were spilled outside of the containment. Two kilograms is a very small quantity. That was recovered and there was no risk to station personnel or to the public. Over the weekend we took the fuel out from channel 6 and we started the draining process to get at the fuel.

When the fuel was taken out, we had eight and a half pencils that had broken loose from the main fuel bundles. Two pencils were recovered from the receiving tray, and we are still investigating six and a half. We are looking for the (inaudible) transfer system in the pressure tube itself. Again, to put it in context, there are 13 bundles per channel and 37 pencils per bundle. So 481 pencils are in the fuelling channel.

We had previously replaced three leaky pressure tubes in this reactor. All the leaks were related to the method of pressure tube installation. On our operating Candu units we have had more than 70 single pressure tube replacements as part of an ongoing maintenance program. We have replaced a calandria tube previously on a Candu. We should have our first look inside the tube some time this week, and metallurgical inspection of the pressure tube

will be done once it is removed. We have replacement tubes available, but at this time we do not know the seriousness of the problem.

Mr. Charlton: Will you be checking other tubes in that reactor at the same time, or will you wait to see what you find on this problem before you decide?

Mr. Niitenberg: We will wait to see what the inside of the tube looks like.

Mr. Charlton: This was a crack in the pressure tube itself.

Mr. Niitenberg: Yes, which we opened up by doing the pressure test.

Mr. Campbell: The important point there was that it was different from the Pickering incident that occurred while the reactor was operating. This reactor was in a shutdown state, and the rupture occurred during pressurization of the reactor in a cold state. That is quite a different question.

Mr. Charlton: The leak was identified before the damage was done.

Mr. Campbell: Yes, the leak was. That has been a common procedure.

Mr. Niitenberg: The leak was so small we could not determine which one of the 480 tubes leaked. It is a standard procedure to put pressure on it to try and open up the leak so you can go after the right tube.

Mrs. Grier: Is the method of constructing these pressure tubes the same as it is at Pickering? I thought it was a different alloy.

Mr. Niitenberg: It is a different alloy.

11:30 a.m.

Mr. Snell: One of the important parts of analysing demand-supply options, and supply options particularly, is flexibility. I want you to clarify a point for us. When an event happens at Pickering or Bruce A such as the heavy water leakage, 750 megawatts or 800 megawatts, or something equivalent in size, goes down for a substantial period of time. In the case of Pickering it is three years, or possibly more. That situation means we need a 25 per cent reserve requirement, which happens to be the highest reserve requirement in any province of Canada. Is it the size of the nuclear units that requires us to have a 25 per cent reserve? Is that the major determinant?

Mr. Niitenberg: No. The reserve level is determined by three key factors. First is the type of system you have. If you have a purely hydraulic system your reserves are lower. Second is the size of your units and the size of your system. Third is the reliability of service. If you did not care about your customers, you would not have any reserve. When your unit goes down, that many customers would just go without, but you are planning the system on a statistical basis knowing that the nuclear units will be available, let us say, 80 per cent of the time on average, and knowing that the hydraulic units will be available for 90 plus per cent of the time.

Mr. Snell: On the other hand, when they are down for maintenance that results in very substantial chunks of generating capacity being out of service. I am still trying to figure out why we need 25 per cent, which is the

highest in the country. Why do we need such a high one in Ontario?

Mr. Niitenberg: There are two things. The key item is that we want to provide the best possible service to our customers and some of the--

Mr. Snell: So there is an subjective analysis there. It is not technical.

Mr. Niitenberg: Some jurisdictions will tell you that is not important.

Mr. Campbell: Yes, it is technical. We could refer you to Du Pont, for example. The reason cited for why they located the nylon plant in the Brockville area of Ontario was the reliability they could not get in other places. If the nylon plant goes down, the nylon hardens and they have to start with a pickaxe and virtually tear the plant down. It is a big investment.

Mr. Snell: I hope they do not have to do that after we get it out of (inaudible).

Mr. Campbell: I was talking to the president of one of the steel companies who was expressing concern about reliability. He said if they lose the power in a steel mill where they have hot steel rolling, that can cause major damage and a major outage. If you are serious about having an advanced industrial society that is going to encourage jobs and investments--I will cite the new General Motors Oshawa plant which is going to be, by all accounts, the most modern car plant in the world--if you are going to get that kind of investment, you have to invest in reliability.

Mr. Charlton: May I move on, Mr. Chairman?

Mr. Chairman: I think you should. You have strayed a little bit off topic here.

Mr. Charlton: Mr. Campbell, you mentioned in your comments that you have some concerns about people making presentations to us promoting simple solutions to complex problems. I do not recall any of those. I recall that some things have been presented that Ontario Hydro has disputed, but I have no recollection of anybody who has made a presentation to us saying, "Believe me, accept my word, do not study the problem, implement it."

We had an excellent presentation yesterday morning, for example, which suggested an approach to demand-side planning, but it did not suggest to us a simple approach. The presenter suggested to us a very complex approach and a very thorough approach and did not suggest in any way, shape or form I am aware of that we should not be thorough in the approach we ultimately decide to take in Ontario.

I do not think anybody on this committee has any intention of taking a simple approach to a complex problem. What we are trying to do is to ensure that everything we think it is reasonable to study is studied, so when we come out the other end, we have all the facts that are required to make the appropriate decisions about what the future will look like. I cannot find in an approach that requires study the problem you seem to be trying to get at.

Mr. Campbell: I can cite a more recent example than your recent hearings. I could look back through the record of previous testimony last year to this committee but I cite an example from our southwestern Ontario

transmission hearings in which a lot of the same issues were being discussed. There was one so-called expert, who has also appeared at your committee, who said: "You do not need transmission lines. In fact, almost over night you can introduce major so-called 'conservation' plans that would make all this unnecessary. You could shut down a lot of your plants." I think this is dangerous nonsense but a lot of people are prepared to accept those simple solutions.

Mr. Charlton: They are still prepared to accept that we should study what is being said.

Mr. Campbell: This fellow cited as an example of how easy changes can be made--he put it on the record--that Ontario Hydro, for example, had switched from 25 to 60 cycle in six months. The record shows that it took over 10 years at a cost of $350 million in 1950 dollars, which would be about $3.5 billion today. Putting that kind of stuff on the record, I would submit, fits the example of someone proposing simple solutions to complex problems and really not knowing what he is talking about. He is being cited as an expert.

Mr. Charlton: Even the individual to whom you were referring--and I think we all know who you are talking about--

Mr. Campbell: Yes. He is cited as an expert.

Mr. Charlton: I recall very clearly when he was here last fall, he suggested that part of what we should be doing is identifying that, and studying, looking at end uses and identifying the extent to which we could use what he has been saying. Again, even when he made his presentation--and it is on the record of this committee as well--he suggested what he believed was possible and he suggested that should be becoming part of our planning process, not that you should drop the planning process. Again, what we are reviewing here is the planning process.

Mr. Chairman: Mr. Charlton, I think you made your point.

Mr. Charlton: There is just one last item that I would like to deal with.

Mr. Chairman: I have an anxious Mr. Sargent.

Mr. Charlton: I cannot remember who made the comment about, although you did not refer to it as the no-losers test--I think that is what we were talking about when you talked about conservation, saving money for some and perhaps causing increased rates for others. It seems to me that if the choices are conservation and/or new generation, I think you all would agree that new generation, generation that is not now planned, is going to increase rates. The costs of the next round of supply-side generation are going to be higher than they have been in the past.

The question we have to answer in the planning process is which is most cost effective. It seems to me that this issue of whether because of conservation some people suffer increased rates is an irrelevant question if the alternative is everybody gets increased rates because of new generation capacity.

Mr. Campbell: We do not differ on that at all. We are dedicated to getting the lowest rates for our customers consistent with maintaining the supplies we need, and having the capacity here to accept new industries and

not to turn them away. That is a balancing act because you are going to have to have new capacity and, I agree, that new capacity will always cost more than the existing capacity. What you have to try to do is match the new capacity with the load so you have customers to pay for it. It is the same as if you build a factory. If you do not have customers for the factory, you are going to be in trouble.

11:40 a.m.

Mr. Charlton: All right. What makes sense is to maximize the most cost-effective before you move to the least cost-effective. What we have to determine first, is the most cost-effective.

Mr. Campbell: I have no quarrel with that at all as long as we do it effectively.

Mr. Charlton: Can we agree to set aside this no-losers issue then in the context of what you have just said, which is that we are going to face those increased rates no matter which way we go? The question is by how much the rates are going to go up and when.

Mr. Campbell: I do not agree we are facing increased rates. Our projections are that our rates in real terms will be dropping in the decade of the 1990s with our present plants. Our objective is to have more competitive rates, lower real rates in the 1990s. If our rates go up by less than inflation, that is a decrease in your costs.

Mr. Charlton: That is true no matter which way we go though, if you are looking for the least cost options first.

Mr. Campbell: That is right.

Mr. Charlton: That is irrelevant to what I am asking.

Mr. Campbell: I would like to go back to the other question. Just because I am critical of what I call people who espouse simple solutions to complex problems, does not mean I am against efficiency. We are as concerned about efficiency as anyone and we want to promote it. I am concerned about over promoting it to the point where it leads us to make wrong decisions.

Mr. Charlton: Whether or not rates are going up in real terms or whether they are declining in real terms, this relationship to inflation question, we all understand that one. We also agree with what you said, that rates are going to go up, whether they are going up in real terms or whether they are just going up on people's bills as compared to what they were for a kilowatt hour last year. The question we have to resolve should not get caught up in questions such as this concept of no losers because there will be no losers if the rates go up less because of things we do, even though for some people their bill may go up and for others who participate in conservation, their bill may go down. The rates will still go up for everyone, whether there is conservation and combinations of other things, or whether it is through supply-side growth in the system. The rates are going to go up. For those people who do not participate in the conservation program and whose rates go up, their rates would have gone up anyway without the conservation program because of new generation. Am I not correct?

Mr. Campbell: I am not sure.

Mr. Niitenberg: A lot of it depends on what type of time frame you use.

Mr. Charlton: That is what I suggested the two questions were. The question is not whether rates are going to go up in the future, they are going to go up. The question is when they will go up and by how much they go up.

Mr. Niitenberg: I happen to disagree with your basic premise that any new plant we bring in is going to be more costly than what we are running.

Mr. Charlton: Has that not been true right through your history?

Mr. Niitenberg: It has been true up to a point. If you average it over the lifetime of production costs, the new plant that we are bringing in is more efficient in the long run. I can give you an example right now which from an operating point of view I would not like to run the system. With industry coming in and efficient use of electricity increasing in the area of deficient substitution and giving comfort to our customers, we will be running Lennox near base load, in which case that operation per unit production cost will be considerably higher than anything else we would be bringing in right now. In certain future load forecasts on areas, that is a possibility.

Mr. Charlton: What I have said is if we take the approach that we only go after electrical energy supplies that are cost-effective.

Mr. Niitenberg: I have great trouble with two comments and one of them is that we know better than our customers. Our customers are going to make a choice. My viewpoint may be clouded--everyone relates to his or her childhood--by the fact that in the society I lived in up to age 11, there were government dictates. My family could not have electricity on Thursdays and somebody else did not have it on Fridays. We had to appear in front of the commissar and explain why we needed it at all. Right now I think it is important that the system be reliable and the customer be given a choice and not try to sort out exactly what the usage will be.

Mr. Charlton: Nobody is questioning that.

Mr. Campbell: That other point that is important is the assumption that new plant is going to be more expensive. We can demonstrate that is not true. Our testimony documented that the last time we were here and we will do it again.

Let us take Darlington. Darlington will produce power at a lower cost than the alternative coal-fired plant retrofitted with scrubbers.

Mr. Charlton: That is not the question I posed to you.

Mr. Campbell: Or even without the scrubbers.

Mr. Charlton: That has nothing to do with the question I put to you.

Mr. Campbell: If I understand you, and I am trying to understand you, you were saying by definition any new plant is going to be more expensive than an existing plant. I am saying the Darlington plant is going to be cheaper than an existing plant or existing alternatives. If you do not build it, you are going to have coal-fired plants and you are going to have to retrofit scrubbers and it is going to be much more expensive than a new plant. We can demonstrate that will be true for most of the new plants we build.

Mr. Charlton: First of all, I did not say--

Mr. McConnell: Mr. Charlton, if I may intervene. I believe this particular discussion started with the question of the no-losers test.

Mr. Charlton: That is right.

Mr. McConnell: I understand your position on the no-losers test. I am reluctant after last fall to say that we are going to be making a presentation on the question of equity. We will be asking the select committee its opinion on the equity issue and specifically in our presentation we will raise the question about the no-losers test. Ontario Hydro's position at the present time is we do not have a conclusion on that particular subject and we will be asking your views. I will be interested if all of the committee is in agreement with you or not.

Mr. Cureatz: We know the answer to that one.

Mr. Campbell: I am a former teacher. There will be a test and it will count.

Mr. Chairman: We have an anxious Mr. Sargent and a very patient Mr. McGuigan.

Mr. Sargent: Bob Saunders used to say that Hydro users do not use it. Conservation was his approach then. I was around with the 25-60 cycle conversion, back about 100 years ago. Hydro, up until now, is the biggest and best plant in the world. It has a wonderful record. I have some questions if we are going to talk about supply. My concern is that we have always been critical of Hydro being the bad guys and it is a good target for the opposition these days.

Mr. Cureatz: Hindsight.

Mr. Campbell: Don't tell those guys. They have not caught on yet.

11:50 a.m.

Mr. Sargent: Going over the supply factor, and I will be as fast as I can, at the outset of the drawing up of the uranium contracts, I always thought Hydro was a partner to that. I find Hydro is in opposition to it. It wanted the government to buy the land in Elliot Lake. That was the position of Hydro. It was the position of two ministers of the party in power then, to buy the land. Somehow, our friend Roman sneaked in there and he got the option on land we still own. These contracts are now up for renewal. They are the most scandalous contracts in the history of the free world. They give the guy $650 million to build the plant; a contract to the year 2010 to guarantee and $2.5 billion in profits. No matter what happens, we still owe the guy $2.5 billion.

Ontario Hydro was opposed to this, but it was a political move at that point. In 1986, these contracts come up for renewal. We have been stockpiling at the rate of $100 million a year. How much of that garbage do you have laying around there? Have we used it all? I do not know. I would like to know somewhere along the line if you can find out the status of the contracts that are going to be renewed.

Are you going to renew at the same terms, the same cost for uranium at $50 a pound or $60 a pound, as against the $25 a pound price at which you can

buy it from the west? I think those are important issues for supply. I am not trying to nail you; you were not party to this thing. What is the situation today? That is what I am concerned about.

Mr. Campbell: On the uranium contracts, I must admit I am not aware of the comments you made about the history of the land and that kind of thing; it would require a lot of research. I do know there was a select committee or committee of the Legislature back in the 1970s, that looked at these Hydro contracts at the time. I think that is all on the record. There were extensive hearings on those issues at the time and it was very clearly aired.

My concern is more the latter part of your question, which was where are we today. I will tell you. While the contracts originally specified into the next century to the year 2010, as you have mentioned, there were cancellation provisions. The Rio Algom contracts were about half the quantity. There is a split between Rio Algom and Denison at Elliot Lake.

Mr. Sargent: They are the short end though.

Mr. Campbell: They were both long-term contracts but they had a different time period.

Mr. Sargent: Percentages.

Mr. Campbell: Supplies are roughly equivalent at the present time. In the future they would shift if they ran their course.

You asked the question: What is the status now? The status of Rio Algom contracts--and this is on the public record--is that they are open for cancellation. We could cancel the Rio Algom contracts now.

Mr. Sargent: I am sorry, I have a question. Are you negotiating now?

Mr. Campbell: Yes. We are negotiating. We have been for some time--many months.

The Denison contracts have a provision that if the price exceeds world reference price for five years, then they are open to cancellation. The way they are going, we expect that they would be open for cancellation around 1990; but the Rio Algom contract could be cancelled now. There is a five-year notice period. In other words, if they were cancelled now, the mine would shut down in 1990.

Mr. Sargent: I am not asking you to state a position that is going to hurt you in negotiations.

Mr. Campbell: No. We try to be careful not to do that. I want to give you the facts.

As you point out, there are richer uranium mines in Saskatchewan. The Ontario mines are at a disadvantage in that their ore is a pound and a half, or two pounds per ton approximately. There are mines in Saskatchewan where they are mining 200 pounds per ton and more in open pit mines, which are much cheaper; so naturally the price from Saskatchewan could be less.

In fact, we exercised some cancellation provisions already. We got voluntary reductions in our supplies from Elliot Lake and we brought lower cost supplies from Saskatchwan to blend to bring the average price down in the interests of our customers.

That caused some concern in Elliot Lake because they said, "You are taking away our jobs." We figured we should try to balance this thing. We have to balance our social responsibility to the community of Elliot Lake. I am told there are 10,000 people there and another 20,000, in round figures, in the industry who depend on those contracts. It is something we have to consider. It is a sensitive issue that the government is going to have to consider, because there is a social cost. For example, if you did cancel and you closed down the town of Elliot Lake, what would happen to all those people and what would be the social cost?

Mr. Sargent: Have you been stockpiling?

Mr. Campbell: No, we are not stockpiling now. We got volunteer reductions in the deliveries from their mines, and we are not in large surplus now. The Japanese and the French keep a three-year supply; we keep a nine-month supply, because the mines are closer to us, so that we are not worried about some kind of cutoff of our supply. We have that in balance.

If those contracts ran their course, we would be in oversupply starting in the 1990s, but we believe we can renegotiate to bring the supply into balance with the demand. We have to balance the cost and we have to balance the social consequences of losing jobs in the community of Elliot Lake, and all that is being negotiated right now. All I can say is that we hope that in the relatively near future--I am talking about months--we will be able to come up with a proposal that the government will have to consider.

Mr. Sargent: Will this be a political decision?

Mr. Campbell: We hope it will be a sound business decision balancing a number of those sensitive issues that I mentioned. It is not going to be easy, but we hope we can come up with some proposal in the next few months that we will put before the government, and then a decision will have to be made at that time.

Mr. Sargent: We own this land. We are renting it to Denison for $7,000 a year; that is what he is paying for this land. You have the power to acquire that through federal law. Is there any thought on that?

Mr. Campbell: The land itself would not do us much good. What we require is a mining operation.

Mr. Sargent: It is only seven acres.

Mr. Campbell: But we are not in the mining business. We would require someone to conduct a mining operation there. Those mines are in operation. The question facing us is really what to do with those contracts, whether we can renegotiate them--

Mr. Sargent: I am sorry; I was wrong on that. There are 2,800 acres.

Tritium is a component used for building things for Star Wars. What is the name of that? It is a main component of plutonium. Are we exporting it to the United States now?

Mr. Campbell: No.

Mr. Sargent: Why are we building a $30-million tritium plant into Darlington?

Mr. Campbell: The heavy water that is used in our reactors, when it is subjected to radioactivity, produces something called tritium, which is a form of hydrogen. It is mildly radioactive. It is a form of pollution, if you like, that gets into the heavy water as a result of the radioactivity in the reactor.

Mr. Sargent: It is in great demand in the United States.

12 noon

Mr. Campbell: As a safety matter for our employees, we are building a plant to reprocess our heavy water to remove the tritium, because it is mildly radioactive. It is not dangerously radioactive. For example, many new aircraft have tritium in their exit lights because they will produce electricity without any external source of power. There are exit lights, road markers and runway lights. You can buy little tritium markers to put beside your light switches so you can find your switches. Tritium produces a luminous glow that is much brighter.

Mr. Sargent: What is your marketplace?

Mr. Campbell: Tritium is also used for commercial fusion. I am not talking about bombs; I am talking about fusion reaction, all the experiments that are being done on fusion.

Mr. Sargent: Can you recycle it?

Mr. Campbell: We will not have tritium coming out of that plant until 1987, I believe, and then it will be in very small quantities. We are talking about a pailful, that kind of quantity.

Mr. Sargent: How much are you spending on the plant?

Mr. Campbell: The basic purpose of extracting it is the safety of our workers. It is a safety measure, but it gives us--

Mr. Sargent: There is no truth in the fact you are going to export it to the United States?

Mr. Campbell: Just a minute; I am coming to that. There is a market for it for medical research purposes, runway lights, safety exit markers--that kind of thing--in hospitals, schools and other places. There is a good, peaceful commercial market.

Mr. Sargent: Not Star Wars.

Mr. Campbell: They are also using it in fusion research. If the world finds an answer to that, we will meet all the world's energy requirements for all time. If that is developed, fusion will probably be the source of energy in the future.

If we decide to sell it--and we have not decided that yet--we could remove it from our reactors and store it. It would deteriorate in about 12 years; it has about a 12-year life and then it is gone. We have not decided to sell it. We could store it or we could sell it for peaceful purposes. We could earn quite a few million dollars. We figure that we could earn $15 million or $20 million a year, which would go back to our customers in terms of lowering rates.

Mr. Sargent: Have you a policy on that?

Mr. Campbell: We do not have a policy, because it is a new product. The federal government put out a policy just a few weeks ago saying it would be controlled and sold only for nonweapons use, because it can be used in nuclear weapons as well. It is an ingredient of nuclear weapons in the same way that steel and all sorts of other materials are ingredients in nuclear weapons.

The US government and the Russian government produce this as a byproduct of their weapons work and they sell it commercially. You can buy it here; you can go down to the United States and buy some. We will have to decide whether to sell it. If we decided to sell it, it would be within the controls laid down by the government of Canada that it would be only for peaceful uses and that it would be monitored. That would be the situation, but that decision has not been made yet.

Mr. Sargent: Thank you very much. I have one more thing. It looks as though we are going to have to live with Darlington. Up our way we say it is like living beside an elephant: It could tramp on you. You do not get used to it, but you stop worrying about the whole damned thing.

Are you involved in a heavy simulator program with your operators? How many simulators do you have for training?

Mr. Niitenberg: We will end up with simulators for every four-unit station we have. There is one for Pickering A, one for Pickering B and one for Bruce A; there will be one for Bruce B and there is one coming for Darlington.

Mr. Campbell: By the way, that has been a great success story in Canadian industry. We worked with Canadian Aviation Electronics to develop the simulators for our plants. They are selling those plants all over the world now, and that is a great export market for Canadian expertise and technology.

Mr. McGuigan: I would like to ask about the summer shortage, which caused us to buy more expensive power from other jurisdictions. During the last two or three years we have really de-emphasized the business of conserving in the area of seasonal advertising, Christmas lights and all that sort of thing. In the last three years people have been lighting up their houses at Christmas as they did prior to the energy problems. How much of that shortage is due to that type of lighting?

What I am leading up to is, could we have taken another tack and gone back and advised people, as we previously did, that our usage was coming up pretty close to the possible supply that we had and that as consumers we should co-operate and take a few steps?

Mr. Niitenberg: I will give you a clarification on system operations. We expect to receive support from neighbouring utilities from time to time in order to keep the lights on, and it is at a cost higher than our own operation. If you do that only occasionally for a couple of hours or a couple of days, it is cost-effective.

The royal commission under Dr. Arthur Porter that studied the system recommended that we should consider the support from other jurisdictions in our reliability calculations. From that point of view, the occurrence took place that we lost a number of transmission lines at the same time as we had a number of units down at Nanticoke and at Lambton with frozen coal; we also had

some nuclear units down on that day. The next day we got some of the equipment back in service, and the supply problem was no longer acute.

We have limited capability of moving electricity into Ontario because of transmission limitations. If those had been stretched, the next step would have been public appeals saying: "We are coming up against a difficult situation. Will you take steps to deprive yourself temporarily of the benefits of electricity in some uses?"

In some cases when we have tried that the response has been good. When we had the strike last May, we were coming up against a limit where we were overloading transmission lines. We put out a radio appeal, and customers responded. We saw a drop of some 200 megawatts.

That would have been next on line, but our first priority was to supply all the needs. As the chairman mentioned, for the day that we were short we supplied those needs at a higher cost.

Mr. McGuigan: That leads me to believe that at that particular time, when you take all our options into consideration, the appeal being the final option, we really were not stretching ourselves as badly as you indicated.

Mr. Niitenberg: Appeal is not the final option. If the appeal does not work, in order to stop the system from breaking itself into little pieces, we actually go into announcing rotating load cuts to hold the system together. That would have been the next step after appeals. We have not had to resort to that, nor would it be normal planning.

12:10 p.m.

Mr. McGuigan: Setting aside cutoffs as an option--and I do set that aside as an option in my own mind; if it came to the place of breaking the system down, of course, you would have to do it--for discussion purposes, setting that aside, the fact that we had to buy some extra power during that period would indicate to me that we really had not run out of all our options, because the option of appealing to the public was not used.

You also turned to these other utilities partly for good relations with them, because if we expect to sell to them at times, we have to buy from them at times. I am developing an opinion in my own mind--I just wanted you to comment on it--that we were not really in any sort of drastic situation and we had not run down 99 per cent of our options when we bought that electricity.

Mr. Niitenberg: We did interrupt interruptable industrial customers, who get a better rate by the fact that when we need that, we draw it. I have to agree with you that, from the point of view of keeping the lights on, we were not really coming up against the problem that in the next five minutes it was going to go out.

Mr. McGuigan: That is my point.

Mr. Niitenberg: But it was not an efficient, economical and reliable way of supplying Ontario loads.

Mr. Campbell: Mr. McGuigan, I did not want to cry wolf and say that we were in danger of having blackouts at that time. What I was saying was that it struck me as a little bit strange that we had a report that said we had surplus for 15 years when we were experiencing that close to the line. It was

not that we were in danger, but we were right down to importing power, expensive oil-fired US power. It indicated that the reserve margins and so forth were not there for 15 years with our existing system.

Mr. McGuigan: I think I understand what you are saying, but I did want to clarify, at least in my own mind, the fact that we were not down to zero.

Mr. Campbell: No.

Mr. McGuigan: I was a bit surprised to learn that we could not use the coal. I recall now the press report that the coal was frozen. It seems to me that a fair answer to that would be a few heating lines or something through the coal pile. Is that not a bit of a poor situation that we would allow ourselves to be limited by coal being frozen?

Mr. Niitenberg: No, this is a fairly normal occurrence in any coal-fired station in cold weather such as ours. Let us use the Lakeview thermal generating station as an example. We are storing 2.5 to three million tons of coal. It gets covered with snow and it rains. We are using road machinery--scrapers and bulldozers--to move the coal into the hoppers. Some of it stays as icy lumps. They are supposed to go up a fairly sharp incline on a belt. Having run that station myself, I can tell you that when these lumps come sliding down, you can have a heck of a mess at the bottom end. Those are the kinds of problems you get into.

On the other hand, in some key places you put heaters, and sometimes these heaters get you into trouble. We had a fire at Atikokan transfer house resulting from one of the heaters trying to eliminate frozen coal. It is a problem that you hope will not occur more than one or two days during the winter, but it is a problem that is very prevalent with our coal plants and those south of the border and out west.

Mr. McGuigan: It would occur almost every winter, then; it is not just a very severe--

Mr. Niitenberg: It occurs one or two days every winter. What you hope is that they will not occur all at once in one station, that some of your bunkers will be full so you can carry on. This time it hit Nanticoke and Lambton at the same time.

Mr. McGuigan: On another subject--I forget who said it, whether it was Mr. Franklin or Mr. Campbell--there are something like 80 or 90 nuclear plants under construction in the USA. We had a witness yesterday saying that there are no new orders and leaving us with the impression that there are no plants under construction, but if there are that many plants under construction--and I have to assume they are large plants--why would they be saying in the US that the lights are going to go out? How do we balance that sort of thing?

Mr. Campbell: We can give you the testimony. I am not an expert on the US system, but I have read the testimony from the US Department of Energy and also from the North American Electric Reliability Council, which was set up after the big blackout in 1965. Many of the utilities down there are profit-making utilities, and the way I hear it, they have decided they can make more profit by stopping construction. They are saying they have underestimated their needs in so many cases.

It is being motivated by profit and, as a result, they are not making the investment in renewing their plants. They predict serious power shortages as a result. The US is an immense economy. The way it is going, they are predicting serious power shortages. If that happens, that will be a great opportunity for us, not to export the power to them, but to have the plants locate here.

Mr. McGuigan: Bring the industry here.

Mr. Campbell: Everybody down there is saying it. It is not a secret.

Mr. McGuigan: Just so you know where I am coming from, I agree from a philosophical point of view that we should be conserving oil. About 60 per cent of the clothing we wear is made from oil. Imagine how many millions of acres of land in food production would have to be devoted to sheep to produce the clothing we wear. We think of it rather facetiously, but that is exactly what we would have to do if we did not have clothing from synthetic fibres.

Mr. Campbell: There is also the whole petrochemical industry and the drug industry.

Mr. McGuigan: Yes. There are all those things.

Mr. Campbell: That is what oil should be used for.

Mr. McGuigan: I have a problem. I will just give you a further example of airplanes. There is absolutely no known fuel for airplanes other than petroleum. There is no other fuel we know of for agricultural use. However, there are other fuels for a great many other uses. I can relate to conserving petroleum resources, but the same ethic does not come across to me for hydro.

In listening to the various people who have given testimony here, I ask myself at times why we should not use hydro a bit more liberally. Part of it comes from water power, and as long as the sun shines, the water will be there. We have undeveloped water resources in Ontario as close as Niagara Falls that could be developed. We seem to have an endless amount of uranium, if we can find a safe way of disposing with the waste. Why not use those items?

12:20 p.m.

What I am leading up to is how much further can we develop nuclear and hydraulic power without bringing about a requirement to develop more coal-, oil- or gas-fired stations? How much of a safety cushion is there in this total system where we could expand? Since water is absolutely nonpolluting and nuclear is less polluting than coal, how much can we expand those two sides before considering the fact that for peaking power we have to expand the coal?

Mr. Campbell: That is really what we want to discuss with you and get your views on in the next while. My personal view is that our future here is to continue to be a great industrial power, which will require more. Our pulp and paper industry will require a great deal more electricity if it is to be competitive. It could well be that our railway should be electrified. We could do that; a lot of European countries have already done that. I think we could probably talk some sense into the railways.

Mr. Haggerty: How about the GO system?

Mr. Campbell: It would be logical for the GO system. There are many opportunities and advantages that are indigenous. Water power and uranium are both indigenous to Ontario, virtually inexhaustible and nonpolluting.

Mr. McConnell: Last fall, when we defined resource conservation, we identified that it embraced three components. One component of resource conservation was to increase efficiency, and that has been discussed this morning. The second is reducing waste. Independent of efficiency, if you can get rid of waste, that is another form of efficiency, if you wish. The third is reducing the consumption of scarce resources. When we look at the electricity supply in Ontario, we are talking about the majority of that energy coming from hydraulic, which is renewable, and uranium, which is abundant.

You mentioned that oil was also a chemical feedstock and talked about producing clothing. Of course, it produces tens of thousands of other products.

Mr. McGuigan: Clothing is the one we would miss most.

Mr. McConnell: Yes. Gas falls into the same category. It also is a hydrocarbon; so both oil and gas are chemical feedstocks.

At present, with oil going down in price and gas considered a bit of a glut on the market with a quite favourable price, I think you will find most people who have studied the subject around the world agree that in the early part of the next century, which is well within the time frame of the decisions we make in Ontario Hydro because, after all, we have many plants still running that were built in the early part of this century--and we are talking about long life for our nuclear plants--there is little doubt that oil and gas, although readily available now at reasonable prices, in the not-far-distant future will be scarce. Within the time frame, the renewable and abundant resources from which we generate electricity will still be there at a relatively low price.

Mr. Campbell: Mr. McGuigan has asked a very good question here. I mentioned before I just got my copy of The Economist. This is a British publication which did an extensive series of articles in 1973 at the height of the oil shortages. It predicted that oil would be a glut on the market and that a major problem of the world in the 1980s would be trying to bail out the oil nations that would be going bankrupt. It has a good record.

Mr. McGuigan: And the Canadian banks.

Mr. Campbell: This is dated March 29, 1986. Just let me read you a couple of excerpts because it bears directly on your question.

Mr. Haggerty: We ought to hire them.

Mr. Campbell: It says: "Only by investing heavily in nuclear power today can the world be sure of avoiding high-cost energy in the 1990s." It is talking about cost. "For many, such a message will sound daft when economies are rediscovering the heady joys of cheap oil. Their complacency is wrong, but it needs to be understood to be countered.

"The price of a barrel of oil has more than halved in just three months, from around $28 to $12. It now costs less in real terms than it did in the 1970s. The price of natural gas and coal has tumbled as well. This new era of cheap energy looks like lasting for several years, and governments, stock markets, smelters and motorists are right to celebrate it.

"But the revellers also need to remember an old saw, that 'the time to repair the roof is when the sun is shining.' Oil remains a finite resource. More of it is burnt each year than is found. By the middle to late 1990s, the Gulf--politically capricious, cartel-minded--will again dominate the oil market, as demand expands and non-OPEC production of the North Sea and North America fall away.

It refers to "shambolic." That is a new term I had not heard before. It sounds like "shambles."It says:

"The shambolic experience of the nuclear industry in America notwithstanding"--that is, the United States, not Canada--"that evidence is now growing into a solid and convincing file. In 1985, the share of electricity produced by nuclear power in the OCED countries reached a new high of nearly 20 per cent, equivalent to roughly six per cent of their total energy requirements. That energy was produced in most instances more cheaply than electricity from other sources and in every instance at less damage to the environment than the world's output of oil and coal. And while several hundred people a year are accidentally killed digging coal from the earth, the nuclear power industry remains as safe as a chocolate factory.

"Efficiency is also improving after a shaky start. The world's nuclear reactors are now achieving average load factors of 70 per cent, the best technical performance in the industry's 30-year history." If we achieved only 70 per cent, of our 20 reactors, we could have six shut down all the time and achieve this goal. They are saying 70 per cent is a pretty good achievement.

"If that achievement can be sustained, the economic arguments for nuclear-generated electricity will be overwhelming.

"Consumers in Britain and those other European countries that are importing the surplus electricity generated by France's nuclear power stations are already seeing for themselves what a difference nuclear power, properly developed, can make to their electricity bills. The power exported by France is 25 per cent cheaper than the power from their domestic suppliers."

That is about the same figure we were telling you. We can produce nuclear power 25 per cent cheaper than coal power.

"For coal-fired and oil-fired power stations to eliminate nuclear's cost advantage, the price of oil and coal would have to stay at today's levels in real terms for a generation. Even then, if others could build their nuclear power stations in the six years it takes the Japanese, rather than the dozen years it takes Americans and non-Frenchmen in Europe, nuclear power would not lose its edge."

Then it goes on to say: "Falling interest rates and lower inflation all around the world, even in once hyperinflationary countries like Argentina, Brazil and Israel, make this cheap energy decade a better time to build capital-intensive nuclear stations than in the late 1970s. America, Britain and West Germany and other laggards will be left at a serious competitive disadvantage unless they can catch up. To do so, their conservative administrations will have to plan and build new plants now."

That is The Economist's assessment.

Mr. Charlton: Unfortunately, I guess the author did not look at the recently released federal study on the health effects on uranium miners.

Mr. Campbell: There are health effects in everything.

Mr. Chairman: Now we are straying. Mr. McGuigan, did you have any more questions?

Mr. McGuigan: I will take a shot at trying to answer Mr. Charlton's question, not the latest one but the one about no losers. Mr. Chairman, it is one you would appreciate, being in the same industry I am.

I have been over in Michigan studying cold storages. Our chairman and I are both in the fruit business. You take fruit off the tree in the heat of the day and you want to cool it down to 32 degrees as quickly as possible. Every hour you delay cooling, it takes about seven or eight hours off shelf life. In the tender fruit, it is very important to cool it immediately.

12:30 p.m.

If we were up against the option of deciding to harvest in the daytime but only cool at night, because it is a lower cost for the electricity, you would almost have to give that electricity away at night before we would pick it up as an option. We would say: "No. We want electricity when we want it, not when you want to give it to us." Even if you forced us to do that and you said, "You cannot have it at this time of year," our option would then be to double or triple the size of our plant and do as the milk people used to do years ago. They made ice over a long period and when they milked the cows twice a day, they had ice in reserve to cool the milk.

We would have to double or triple the size of our plant to accommodate this. Therefore, it is a case of a far greater cost to double or triple the size of our plant than to pay extra for the hydro. There may be other areas where there are no losers.

I understood your question, Mr. Charlton, which I thought was a darned good one. If you are going to face higher costs, why not face those higher costs in terms of a premium which you would put on at certain times of the day compared to a premium in building plants down the road.

Mr. Charlton: My question was much bigger than that.

Mr. McGuigan: I thought it was a good question.

Mr. Cureatz: Why do you two not sort this out on your own?

Mr. McGuigan: I am quite willing to do that.

Mr. Chairman: Before we adjourn, members of the committee, we have spent a considerable amount of time this morning with Mr. Campbell, Mr. Franklin, Mr. Niitenberg and others. At your request, you have had an opportunity to put your questions to the executive members of Hydro. I propose to start at item 3 with Mr. McConnell right after lunch. I hope we will be able to move through items 3, 4 and 5 this afternoon without very many breaks for questions, bearing in mind that there may be some short, concise questions put to the individuals making the presentations. We stand adjourned until two o'clock.

The committee recessed at 12:33 p.m.

N-36

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

WEDNESDAY, APRIL 2, 1986

Afternoon Sitting

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Leluk, N. G. (York West PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Forsyth, S.

Staff:
Moore, L., Adviser, Electricity Section, Policy and Planning Division, Ministry of Energy
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

From Ontario Hydro:
McConnell, L. G., Vice-President, Power System Program
Hill, A., Director, System Planning Division
MacKay-Lassonde, C., Manager, Load Forecasts, Economics and Forecasts Division
Campbell, T., Chairman
Rothman, M. P., Chief Economist, Economics and Forecasts Division
Snelson, J. K., Assistant to the Director, System Planning Division

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday, April 2, 1986

The committee resumed at 2:06 p.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: Mr. McConnell, I suggested to you before lunch we would start at item 3 and we would try to restrict our questions. If they have questions, I will ask members of the committee to note them. We will let you go through items 3 and 4 and deal with the questions at that point.

Mr. McConnell: I see Mr. Ashe did not make it.

Mr. Chairman: He will be back.

Mr. McConnell: When the chairman commented this morning that we were pleased to be here again, he looked at us with a jaundiced eye and could not quite believe it. However, we really are pleased to be invited again to discuss the demand and supply options study with the committee. We are in the middle of this study, and it gives us an opportunity to get input from you, in addition to all the other groups with which we are consulting at the moment, before we formulate any recommendations.

First, I will comment briefly about how we got into this study. As you know, in the 1970s our load forecasts and those of all the utilities in North America--and, for that matter, all the economic forecasts that had nothing to do with electricity--were high. By the late 1970s, it became apparent that some of the plants we had under construction were not going to be needed.

From 1978 to 1982, the focus of planning in Ontario Hydro was adjusted to lower growth. From a resource planning point of view, it consisted of three things. We were involved in cancellations. An example of that was the Wesleyville station, which was oil-fired, a high-cost, high fueler. Although it was committed when the price of oil was low, when we cancelled it the price of oil had already shot up. Other examples were deferrals. We deferred our large nuclear plants, although they had low fuel costs and were expected to be economic over the long term. Bruce B and Darlington were the stations most affected. Third, we did some mothballing. Some existing fossil-fired plants were mothballed because they were not needed for some time. They also were high fuel-cost stations burning coal, such as our older plants, Hearn and Keith.

In the last three years, 1983-1985, we found ourselves in an economic rebound. With that came large growth in electricity demand following the 1981-82 recession. Interestingly enough, in the period from 1983 to 1985 the demand for electricity has grown more than it has at any other time in the history of Ontario Hydro.

By 1984 it became clear that instead of doing planning associated with cancellations, deferrals and mothballings, the existing and committed capacity would be adequate only until the mid-to-late 1990s. The focus in planning had to shift to new demand and supply options.

Mr. Cureatz: Excuse me. Was the prediction that your supply would last only to the mid-1990s based on the percentage increase you had from 1983 to 1985?

Mr. McConnell: No, we did not change the load forecast at that time. On the other hand, the large increase that had occurred in those three years meant our margin had evaporated and we were back in a mode with the previous load forecast.

You have to avoid the temptation of assuming the big increases that occur in two or three years are going to continue. We did not raise the forecast. We just had to adjust to the fact that there had been a lot of growth in those three years.

Mr. Chairman: I will ask members of the committee to avoid the temptation of asking questions until we can get through the presentation, if that is possible. Thank you for your indulgence.

Mr. McConnell: At that time, the demand and supply options study was initiated with the approval of the Ontario Hydro board of directors. This study, as indicated this morning, will produce a framework to guide future decision-making on demand and supply resources.

In a letter he sent to Ontario Hydro, Mr. Andrewes asked us to address a number of issues in this session. The issues he asked us to address are issues with which we are wrestling in phase 2 of our study. In addition to addressing the issues that were in Mr. Andrewes's letter, we will also be raising a number of other issues that we will be putting to you. Certainly, if you could give us input, that would be helpful to us.

I would next like to outline very briefly what we will be presenting to you today and tomorrow. You have already heard the opening remarks of our chairman, Mr. Campbell, and the remarks of our new president, Bob Franklin. Currently, I am trying to give you a brief overview.

Following my presentation will be a presentation by Art Hill, which will remind you of some of the fundamentals of a bulk electricity system and the evaluation criteria we need to consider when we have to make tradeoffs. Then we will make a presentation on demand-management options and a presentation on supply options. We will discuss with you the process we are going through on public consultation and public issues. Finally, we would like to review all the issues, both the issues you asked us to talk about and the issues we will be introducing.

I will take these presentations one at a time and touch on a few of the high spots. On presentation 4, after talking briefly about some of the fundamental characteristics of the electric power system, we will be talking to you about band-width load forecast. We will be giving you a quantitative feel for the requirements associated with required supply and planned supply during the next couple of decades, reidentifying for you the evaluation criteria we regard as important and talking to you about the concept of standard costs.

In presentation 5, we propose to talk on demand-management options. First, we would like to define some of the terms we are using in demand management, so there will be a common language with you and how the demand management relates to the load forecast.

The demand and supply options study is really a focus on the future. For that reason, we are somewhat reluctant to talk about the past. However, we did learn some lessons in the past as we applied demand management. We have been in the demand-management business for more than half a century now and we would like to give you definitive examples of demand management in Ontario Hydro over the years and also emphasize some of the lessons we learned that we have to take into account in shaping the future.

Then we would like to be more quantitative and talk to you in definitive terms about the potential for demand management. Finally, there are some demand-management issues we would like to have you address and give us your views on. We will come back to the other demand-management issues but a major part of our two days is associated with demand management.

We propose to spend a little bit of time on the supply options. Again with regard to the work we did on phase 1, we would like to have a brief discussion of these supply options, talk briefly about where we are in terms of purchases from Manitoba and Quebec, review some of the basics having to do with independent generation in Ontario, talk briefly about Ontario hydraulics and give you a few examples of the many alternative technologies we have examined.

We would like to finish off with again posing some questions to this committee on supply issues that involve noneconomic considerations where tradeoffs need to be made. We would like to put some questions to you in that particular area.

In presentation 7, we would like to talk about the public consultation process and how we are going about identifying some of the public issues and asking for input from the public. At that time, we will give you some more subjects to wrestle with on which we would like your input.

In terms of the overview of the issues, in the last presentation, number 8, we are going to try to draw all the threads together by summarizing the issues that were raised by the select committee and the issues that Ontario Hydro have put forward to you. We will talk about each of these issues one by one and we will try to provide evidence that we addressed all of the questions you have put to us. Certainly, we will value your input as we wrestle with the attempt to develop recommendations by November of this year.

In the remainder of my presentation, I would like to talk a little bit about the planning environment and the planning process itself, just by way of introduction.

As a public utility, Ontario Hydro has objectives in planning. What we are trying to do is to achieve the highest possible degree of customer satisfaction. Simultaneously, we are trying to go about our work in such a way that we get the greatest benefits for the province as a whole. I believe there were questions relating to that this morning.

2:20 p.m.

We focus on the two things. Our activities and our decisions focus on our customers and they focus on what we might contribute to help the province as a whole.

All our planning processes receive input, review and approval by public bodies, including government policy input and approval. We also seek input from the general public. During the course of this year, we will be trying through surveys to get a handle on the values of the public at this time.

We cannot plan a system without consideration of the other utilities with which our operations must co-ordinate. The municipal utilities are customers and partners in electricity supply in Ontario and our plans have to co-ordinate with their existing and planned supplies.

We are also interconnected directly with other major utilities in neighbouring provinces and states and indirectly with most of North America. Our plans must meet minimum agreed-upon standards so that we are not a burden on our neighbours. We must be aware of the technologies that are available, both the old and the new. To do this, we must keep our knowhow up to date.

For example, Ontario Hydro participates in national organizations in Canada, such as the Canadian Electrical Association. We play a major role in that. In North America as a whole, we are a major partner in the Northeast Power Co-ordinating Council. That includes Quebec, New Brunswick, all the New England states and all the New York utilities. We participate in international organizations such as the International Conference on Large Electrical Systems, also called CIGRE. All those organizations involve planning, and we are a major participant. That gives us an opportunity to know what is going on in the planning field worldwide.

The planning environment, as I am sure you appreciate, is not a static situation. Things are changing all the time. In other words, it is a very dynamic thing. Our plans have to be reviewed every year. Therefore, we are constantly adjusting to react to the real world as it unfolds. I would like to talk briefly about the planning process.

The planning process that we have is an integrated process which includes load forecasting, demand planning and supply planning. In our process we consider economic, social, environmental and technical factors. In particular, our planning includes band-width or range-load forecasts rather than single-line projections.

Our process involves risk analysis, which is a systematic treatment of uncertainty. Our process also involves a least total-cost approach. The total-cost process that we use and have been using for a long time includes external costs such as customer expenditures for demand options and customer damage costs caused by power supply interruptions. In North America we are regarded as the leader in developing this technique of including customer damage costs in our evaluations.

There are many levels of plans we have to consider: short-term plans for operating the existing system; long-term plans for possible additions to the system, which extend up to 20 years or more; and broad strategic plans, which give general direction to the other more detailed planning processes. An example of this is the system expansion program reassessment study we did back in the 1970s, which gave us a handle on tradeoffs. For example, the study gave us a handle on the tradeoffs between the costs our customers suffer when we interrupt the power and what we have to pay to supply the power.

Contrary to the impression we have perhaps created with you in talking about the 25 per cent reserve, we do not really work to a 25 per cent reserve. We work to a standard of reliability of 25 system minutes, which came out of the System Expansion Program Reassessment Study.

Incidentally, the demand and supply options study is an example of a strategic study. All the plans that we produce undergo extensive review. All our plans are approved by the Ontario Hydro board and all our major proposals are submitted to the government. We also place the documents associated with our plans in Ontario Hydro's public reference document, which is available to any interested member of the public.

To talk briefly about the approval process internally in Ontario Hydro, there are a number of stages of internal review and approval before Ontario Hydro will implement a plan. Plans are reviewed by many levels of staff, including reviews of committees of the vice-presidents, such as our strategy advisory committee. Before going to the board of directors, all plans must be approved by the executive office. Our board of directors is made up of individuals with a wide range of experience in such fields as finance, labour, farming and so on. Major plans such as the demand and supply options study will be reviewed for social acceptability by the social responsibility committee of our board, which has existed for several years. They are also reviewed for technical soundness by the technical advisory committee, which also comprises members of our board. Finally, they go to our board of directors for their consideration.

I would like to talk briefly about the approval processes that we go through externally. All plans are prepared in conformance with government policy direction. All major projects are subject to the Environmental Assessment Act. All relevant government departments have an opportunity to review the environmental assessment document, and in the environmental hearings all interested parties can be heard. Approvals may also be required from other boards, such as the Atomic Energy Control Board. Finally, before construction can start or any order can be placed, the government must issue an order in council. For major projects the time to get all the external approvals is typically five to eight years. That is independent of how long it takes to construct.

I will talk briefly about the process we are going through in the demand and supply options study. The focus of this study is on decision-making for the future demand and supply options that will be required to meet the electricity needs of Ontario. The time available for this hearing to deal with such a broad and complex subject is very short. We propose to concentrate on a constructive examination of the future possibilities and opportunities rather than to dwell on the past. The focus is on the decisions that are required in the next five years, and these decisions will result in demand programs or supply options that will become effective within the next 20 years. Demand programs started now will take several years to penetrate a large part of the available market. New generating stations take several years to build. Once in place, the options we select in the next few years will affect the operation of the system for their full useful lives. Decision-making in the next five years affects system operation for many decades.

Let us talk about what will be coming out the spout. What is the end product associated with this demand and supply options study? The end product of the demand and supply options study will be what we call a resource development strategy. That is essentially a framework that will guide future decision-making. It comprises a set of principles and preferences that can be used to guide us when we make more detailed choices.

2:30 p.m.

I want to avoid any possibility of a misunderstanding. The end product will not be a detailed plan specifying which option will be developed each year for the next 20 years. We produce future resource plans annually. They will be produced independently, but we propose that when we produce them, they will apply the resource development strategy that is the outcome of our demand-supply options study. The resource plan will need regular adjustment to respond to changing circumstances as the real world unfolds.

The acceptance by the Ontario Hydro board and the provincial government of the resource development strategy resulting from our study will not constitute approval of any specific demand program or any specific supply project. Each project will require its own approvals as appropriate to the option. The demand and supply options study does not replace normal planning and approval procedures, it supplements them.

Now I would like to talk briefly about phase 1. The first phase of the demand and supply options study examined all the feasible options. The analysis was a simplified analysis of the generic characteristics of each option.

The main results of this phase, which was completed in July of last year, are that we identified for each option a standard cost, we looked at the sensitivity of the standard cost to a variety of factors which applied to that option and we produced an estimate of the potential that could be developed by the year 2000 for both demand and supply.

The results of this phase are documented in reports that are available to this committee and that you have already received. The results of phase 1 provide the information base for our public consultation programs and for most of the information on the options we are going to present to this committee. The results of phase 1 also enable us to set up the detailed representative plans. These representative plans are being studied as a part of phase 2.

I would like to move on to phase 2, which is called the plan analysis phase. This phase is in progress with a new target completion of December 1986. In this phase we will be producing a tentative resource development strategy. In other words, we will have something by December of this year at which people can take potshots. We are not saying this is final. Basically it is a tentative resource development strategy; it is the early draft of what will be the final product.

We had hoped to be at that stage when we first started. This was well before we had any definitive ideas of how we would go about public consultation, and it was well before there was any change in the government. At that particular point we had hoped to be at the stage where we would have the equivalent of phase 2 completed in May of this year.

We have slipped in our schedule some seven months, and it was not totally because of the select committee hearings. The total slippage that was due to the select committee hearings last fall and now is approximately 16 weeks. That included the time we had to devote to prepare and to present the material and to do the follow-up.

When we first set down the schedule we did not have that clear an idea of how we were going to get public input, and as the study proceeded, we got more definitive ideas of how we were going to get public input. There are a number of things like this that have been affecting our schedule.

However, our original plan did not take into account getting reviews by the public after we had produced the study, nor did it include the time for government approval. Therefore, although we are talking about finishing at the end of next year rather than the middle of this year, our new schedule takes into account a fuller process, but it is still very tentative. We are hoping at the end of this year, at the end of phase 2, to have a tentative resource development strategy.

This top part shows phase 1; this is a review of the timetable. In July 1985 we finished phase 1. Currently we are working on phase 2, this plan analysis, and we are looking for public and government consultation and discussion of tradeoffs based upon what we had in phase 1. That is in progress now. We propose by December of this year to have our tentative product. At that time we are talking about a plan development phase, which in essence would seek further government and public consultation. This would then produce a more definitive product in about July 1987. At that time we still want to be in alignment with the government. There would be a review and further modifications.

We have this target of November 1987. The reason we show this all in dotted lines is that as we go forward, we learn. We have never been through a process like this before. As one person I would be very surprised if the study got completed that way. In other words, we will probably be adjusting it further as we go.

That gives you our current ideas. That completes my presentation. Thank you. I will now call on Art Hill.

Mr. Hill: I would like to give you, first of all, a brief outline of what we are going to try to do in section 4 of the presentation. I will start by giving an overview of electricity and the electrical power system. Then I will ask Claudette MacKay-Lassonde to talk about the load forecasts, from historical and future perspectives. I will return and talk about load and capacity comparisons and the need for new options. Then I will talk about evaluation criteria and standard costs.

I will say right up front that I believe your consultants have given you a pretty good background briefing on the evaluation criteria and standard costs. I will not dwell on them at great length because you have probably grasped a heck of a lot about them. I do not want to use your time, which could be used more profitably.

First of all in my presentation outline I will deal with electricity, the electrical power system and the customers' electricity needs.

Electricity is a manufactured product. I must confess to some frustration at times because people do not understand that it is being instantaneously consumed as it is produced. My wife, if she has a problem, complains to me that the hydro is of poor quality and, of course, I always refer to the operations group; I tell her it is operations' fault. It is not something you can store; it has no shelf life. It can be stored in other energy forms, such as water, but it has no shelf life.

2:40 p.m.

Ontario Hydro, like the other utilities on this continent, delivers electrical power to its customers at an acceptable voltage and constant frequency. The frequency is invariably 60 hertz. There is very little deviation from that frequency.

Except for some interruptible contracts, which were mentioned this morning, the time, duration and quantity of demand are determined by the customer. Therefore, Hydro needs to forecast hourly, daily and seasonal variations in demand as well as the annual peak, or maximum values.

I know that some of you went to Richview last year. You saw the operation of the Richview control centre, and it is managing the entire system from minute to minute, hour to hour, day to day.

The amount of power produced or consumed is called the capacity or demand. This is normally measured in kilowatts, sometimes in gigawatts and sometimes in megawatts. The peak capacity at any time is the maximum level of power produced or consumed. It should be "produced and consumed," because if the two do not match, that means we have a problem.

The quantity of electrical power is consumed over a period of time, and that is called energy. It is normally measured in kilowatt-hours, megawatt-hours or terawatt-hours. Megawatt-hours are billions of watt-hours; terawatt-hours are trillions of watt-hours. We put out large quantities of power.

The power system, simplified, has basically five major components. The generating units produce the electrical power. Bulk transmission facilities interconnect the generating units and the load centres. There are distribution facilities to deliver the power further down the line to the customer. I show one illustration of transformers between the distribution system and the consumers. That is very much a simplification, of course, because there are step-up transformers from generation to transmission, there are step-down transformers from transmission to distribution and there are further step-down transformers between distribution and the consumer. There are a number of components in the path system between the generating units and the consumer.

The whole thing has to be protected and controlled at all times. Electricity travels very fast. This means that faults happen very fast. Faults have to be corrected virtually instantaneously; otherwise, generating units will be tripped or breakers will be opened and the customer will be disconnected.

I would add one final point to this. Planning is not just planning in the sense of drawing lines on paper. More than two thirds of our effort in system planning in Ontario Hydro is in designing our system. It has to be designed for normal, stable conditions, which we enjoy most of the time but not all the time. It has to be designed so it will cope with upset or disturbance conditions. One example that everyone will remember was May 31 last year, when the tornado went through. That is a graphic example of a transient condition. The system has to be able to cope with the disturbance that occurs then, and it has to be restored and go back into stable conditions. If it does not, the whole system will collapse, which is what happened on November 9, 1965. In essence, everything we do has to be designed so that it will work under stable conditions, will survive the disturbances and be stable afterwards. One of our biggest problems is the latter.

There are some other key components of the electrical power system in addition to the facilities. There is the primary fuel supply, about which there has been a good deal of discussion. We talked about that last fall. There are the municipal utilities which buy two thirds of what Ontario Hydro produces. They distribute it and service the customers.

Last but by no means least, there is customer service. Not only does Ontario Hydro have to provide the customer with electricity when he wants it, but must continue to provide a broad range of related services, such as electrical inspection. We continue to work with all our customers: the municipal utilities, which are the largest as a group, the direct industrials and the rural customers. We work directly with the direct industrials. All direct industrials buy from Ontario Hydro, but many industrials buy through the municipal utilities. We want to assist them in getting the greatest benefit out of the power system.

Mention was made this morning of General Motors. We have been running a 230,000-volt supply into the new General Motors facility at Oshawa. The lead time for an industrial supply is when the industry wants the supply. Speaking in general, those we have done have been in the order of three years or less. It is essential that we get the supply in when the manufacturing industry or resource industry wants it.

Mr. Sargent: Is General Motors one of the heaviest users to supply?

Mr. Hill: It probably is. Yes, we are supplying it with 230 kilovolts. General Motors will own its own transformer station onsite.

I would like to speak briefly about stakeholder considerations. In planning to meet the needs for electricity, we are trying to serve the interests of these stakeholders. There are the customer interests, community interests, the utility considerations--both ours and the municipal utilities--and government requirements.

Finally, on planning considerations: planning involves making decisions among tradeoffs. Those tradeoffs occur among a number of objectives. The technical ones we can grasp pretty firmly, but some of the other tradeoffs are not quite so easy. Our goal, which we talked about previously, has a broad perspective to meet the requirements of the Ontario community for electrical service at the lowest long-term cost to the customer and in such a way as to provide the greatest overall benefit to the community. Judgements have to be made in trading off the lowest long-term cost against the other benefits.

Planning decisions must be made in the face of uncertainty. That was mentioned several times yesterday. One of the largest uncertainties in planning the system is the load forecast, which Claudette will discuss next. Recognizing the uncertainty in forecasting future electrical demand, Ontario Hydro will evaluate its demand-supply options based on a range of possible forecasts rather than on a single forecast, as Lorne has just said.

The decisions on the demand-supply options must also recognize the flexibility of plans to adapt to load growths that may be higher or lower than the most probable or median forecast. Those we have outlined in the following presentations. We are committed to a planning process that emphasizes the least cost to the customer, the greatest net benefit to the province, a bandwidth, not a single-point, forecast, and flexibility to adapt to changing conditions.

2:50 p.m.

A question came up yesterday about change in organization and I felt it of some value to say that we did recognize the need to make some change in organization in September 1984 when we started the study. We made a section change in the system planning division. When we set up, we changed the name of an organization of one section and made it a demand-supply section.

I will now ask Claudette to come and talk about the load forecast.

Mr. McConnell: As people come forward, we will be asking them to introduce themselves with respect to the position they occupy at Ontario Hydro and what they do. In the case of Claudette MacKay-Lassonde, I think people here will be interested to know that Claudette will be the new president of the Ontario Association of Professional Engineers this year.

Ms. MacKay-Lassonde: I am manager of the load forecast department of Ontario Hydro. The load forecast department is part of the economics division and has responsibility for projecting the electricity demand in Ontario in both the short term and the long term. The short-term forecast is used, for example, in the rate base submission. The long-term forecast is used for 20-year forecasts and thus is essentially the subject of today's presentation.

In my presentation, I will concentrate on the role of the load forecast in the planning process of Ontario Hydro. In particular, I will touch on how the load forecast helps those involved in the demand and supply options study. I will describe how we do our load forecast and what we are doing to improve it. I will show you our electrical load growth since the 1920s and talk about the size and trends of Ontario annual load changes. I will briefly highlight the relationship between the electricity consumption and the state of the economy and review our current forecast using the historical base that I will have previously described. Finally, I will compare our forecast to those prepared by other Canadian forecasters.

Let us start with the role of load forecasts in planning. The ultimate purpose of the load forecast is to provide a probabilistic range of the future demand for electricity. It is based on the best factual information available, our experience and judgement.

The degree of uncertainty about the forecast must be specified as an integral part of the forecast itself. To do that, we provide a range or a band within which the actual electricity demand, 10 or 15 years from now, is likely to fall. Uncertainty in the load forecast arises from uncertainty about the many factors that influence energy consumption. Most important are the level of population and economic activity, energy prices and the response of energy users to changes in those factors.

To recognize this uncertainty, we present our forecast, as I mentioned before, as a range, not as a single line. With the range forecast, we are saying that no one outcome is so certain that we can plan for it and no others. This range is derived by statistical techniques which essentially assume that the world is no more uncertain today than it was in the past. Our message to the planners and engineers is that the future demand for electricity has a 60 per cent probability of being within the band we have described.

How do we do our forecast? To quantify the effects of the complex network of factors that influence energy demand in the longer term, we use three models; two econometric ones, also referred to as "top-down", and one end-use, also referred to as "bottom-up".

The identification model, a single-equation, multiple regression, econometric model, determines energy demands on the basis of relatively few economic variables.

The economic and demographic energy model is a more comprehensive econometric model which produces long-term demographic, economic and energy forecasts. Energy demand is related to economic and demographic variables using statistical techniques. Both top-down models forecast the future by analysing consumer behaviour.

The end-use model, on the other hand, is an engineering-oriented model which derives electricity demand from a bottom-up approach. It adds up the demand created by each end use of electricity and other fuels. We use judgement and experience when we compare and review the results of those models and generate the most likely forecast.

Let me talk next about what we are doing to improve our forecasts. First, we keep in close contact with our counterparts in the energy forecasting community, both in this country and in the United States. We constantly seek new methods and techniques to make our forecasts better.

For example, last year we worked very closely with the Electric Power Research Institute of California on the development and testing of a new short-term forecasting model. Next month, we will be sharing our knowledge of that model with other EPRI members to help them use it.

This year, we have completed our assessment of two new end-use, long-term forecasting models also developed by EPRI. These models represent the state-of-the-art developments in forecasting residential and commercial electricity demand. We have just placed an order to purchase both models.

Let us review our historical load growth. As Art Hill explained in the previous presentation, the two important variables of concern to load forecasting are peak power and energy. This chart shows how the demand for electrical energy has developed since 1925. As you can see, the growth has been very smooth, with a small irregularity during the 1982 recession. The corresponding power peak-demand chart is a little more bumpy, since peak is more strongly affected by weather, and we know that weather is highly variable.

As you saw on the previous charts, electrical energy demand appears to have been growing steadily since the 1920s; however, a closer look at the actual size of the year-to-year changes shows that they have fluctuated quite a bit. As I have shown in this table, the average annual increase in electricity demand in terawatt hours is greater now than it was in the days of our seven per cent average growth 20 years ago. In particular, over the past three years the annual changes were bigger than the power used in a single year by the city of Ottawa.

I have provided more detail on the annual load changes in the appendix attached to this presentation.

Now I would like to talk about the relationship of electricity use to the economy. One of the most important factors influencing electricity demand is the level of economic activity. The economy of the province, measured by gross provincial product, or GPP, and the demand for electricity have been closely linked since the beginning of electricity generation in Ontario. The exact relationship has changed over time in response to a number of other factors.

To illustrate this, we have calculated how much electricity was used for each dollar of the gross provincial product in every year from 1945 to 1985. The chart shows that Ontario used more and more electricity in the 1950s and

1960s, when electricity prices were lower and the province was industrializing rapidly.

3 p.m.

The question we ask ourselves now is whether this relationship, which has been fairly linear, will hold its course or whether it can change as a result of an increasing movement towards energy conservation.

In our forecast, we project that Ontario is at a turning point in its use of electricity. We project that the increasing conservation will balance sufficiently the new uses of electricity to make the amount of electricity we need for each dollar of output start to fall slowly, reversing somewhat the trend of the last 60 years.

This next chart is essentially a compression of the previous one where we have compressed the actual data, both vertically and horizontally, to which we have added our long-term forecast. As I mentioned earlier, our forecast is prepared in a range form to account for the uncertainty of the factors influencing electricity consumption.

In this chart, you see our forecast for energy. The important observation from this picture is the rapid widening of the band of the forecast as we go further and further into the future. As a matter of fact, in the year 2005, the width of the band is slightly larger than the actual demand we experienced in 1985. Our planners must face the challenge of recommending the best ways of coping with a future that has this much variability associated with it.

In the next chart, I would like to compare our forecast with others. I have shown here our forecasts in comparison to recent forecasts of Ontario electrical energy demand prepared by the Canadian Energy Research Institute, the federal Department of Energy, Mines and Resources, the National Energy Board, the Ontario Ministry of Energy and the Soft Energy Paths study. For the sake of clarity, we have shown only the median, or most likely, values of all these forecasts.

In the next chart, I am showing you the values of other Canadian utilities' forecasts with our own. Ontario Hydro is the red one here.

This essentially concludes my presentation. I have told you very briefly about the role of the load forecast in the planning process. I have talked about our load forecast and what we are doing to improve it. I have reviewed our electrical load growth since the 1920s. I have touched on the relationship between electricity use and the economy and have talked about our current forecast and how it compares with those of other forecasters.

Mr. McConnell: The remaining two presentations to complete number 4 are the load capacity comparison and a brief presentation on evaluation criteria and standard costs, both of which will be presented by Arthur Hill.

Mr. Hill: In this next presentation, I take a quick look at load and capacity to set the scene for why we are saying we should start planning now. I would like to review why we think we will require additional demand and supply options to meet future needs. To illustrate this, I will briefly discuss the present installed and committed generating capacity, the December 1985 system demand and a future demand example based on the current forecast and the December 1985 supply and a future planned supply example based on the

current program. I will also illustrate the gap that needs to be satisfied by future adoption of demand and supply options and hence why planning is important now.

Installed and committed generation: After 1992, we will have a generating capacity of about 34,000 megawatts. This is based on assumptions that include everything installed and operating, everything mothballed and everything now committed. The assumption is also that all four Darlington units will come into service to give the total of 34,000 megawatts.

This table is an example of the way demand could grow between the actual load of December 1985 and the future date of December 2004. The actual load in December 1985 was 20.5 gigawatts, which is 20,500 megawatts. Looking at the future date of December 2004, the forecast load would be 34.3 megawatts. This has had 3.2 gigawatts subtracted from it to produce a basic load forecast in the year December 2004 of 31.1 megawatts.

A further reduction of one gigawatt and 2.1 gigawatts are subtracted to give 28 gigawatts as the planning firm load in December 2004. As you can see, the one gigawatt and the 2.1 gigawatt come from load management. The required reserve of 6.4 gigawatts, which is approximately 23 per cent, would give a required supply in December 2004--

Mr. Sargent: Can you go back to the top again, to the actual load in December 1985? What was your generating capacity there?

Mr. Hill: That is on the next illustration, Mr. Sargent. If you can just give me about 60 seconds, we will get to it.

Mr. Sargent: Sorry.

Mr. Hill: This was said at least once this morning. I would like to say at this point that in presentation 5--5B and 5D specifically--by Claudette MacKay-Lassonde and Rick Fleming, when they come to make those presentations, they will talk about the conservation achieved here and the demand management achieved here and here. We are looking at a required supply of 34.4, or a possible required supply in December 2004 based on the median load forecast of 34.4 gigawatts.

Turning to the supply side and answering Mr. Sargent's question, first of all, the utilized generation in December 1985 was 24.3 gigawatts and that is the number to compare with the actual demand of 20.5 gigawatts. That is the utilized generation. It is the total installed and not mothballed.

Mr. Sargent: You have a 20 per cent surplus.

3:10 p.m.

Mr. McConnell: No, there is a zero per cent surplus. The 20 per cent was the reserve margin. That is what allows for the maintenance troubles. We discussed that this morning and indicated that we were walking on the dotted line. We were just able to meet the load last winter.

Mr. Sargent: I got it. Thank you.

Mr. Hill: The mothballed generation of December 1985 totalled 3.8 gigawatts. That was made up of Hearn, Keith, Thunder Bay unit 1 and all four Lennox units, making up the total of 3.8 gigawatts.

The committed generation up to December 1985 totalled 5.8 gigawatts. Hence, the installed and committed generation up to December 2004 would be 33.9 gigawatts.

The planned retirements up to December 2004, on the next line with a minus sign for subtraction, comprise Hearn, Keith and Thunder Bay unit 1. If they are normally retired, they would be subtracted from that total to produce 32.3 gigawatts.

As indicated in the example, at the present time we are assuming no firm purchases and no firm sales; so the planned supply we would require would be 32.3 gigawatts.

The required supply as things stand at the moment, as we have seen from the previous example, will be 34.4 gigawatts. This leaves us with two possible gaps. We will have 2.1 gigawatts of reliable supply if we assume we will restart Lennox, or 4.3 gigawatts of economical supply if we assume Lennox may stay in mothballs. That, I think, is dependent on the future price of oil.

In this illustration I have shown an example of the future demand and an example of the future supply, as if the process I have just gone through were repeated for each year from now to the year 2004. Hence, we can see the deficit showing up when the required supply, shown by the bottom line becoming the top line, exceeds the planned supply.

In this illustration, that occurs in the year 1999. It could be as early as 1994 if the load grows at the upper load growth, or it could be after the year 2004, if the load grows at the lower load growth.

The answer appears to be that the additional need could be about 4,300 megawatts by the early 2000s. That needs to be be made up either by demand management or by supply options.

In conclusion, I think it is self-evident that we need to take action to reduce the required supply or to increase the planned supply. The demand and supply study is trying to examine the options available to us to do this. We believe we should act now. We are acting now on some of the demand-management initiatives, which you will hear about in presentation 5. We are now acting on some of the hydraulic generation options that are still available to us in the Mattagami and Little Jackfish projects and in the redevelopment of available power at Niagara.

We are here to describe to you what we are doing and to obtain your comments in the time remaining to us during the course of your committee hearings.

I would now like to move to the final presentation in this section, which deals with evaluation criteria and standard costs. I propose to discuss the key evaluation criteria used for planning and to describe the standard costing technique used in the first phase of the demand and supply options study.

Evaluation criteria are used to assess and compare the merits of utilizing the various energy options in the electricity system. The standard costing technique was used to compare the long-run costs of the wide range of options considered in the demand and supply options study.

I would again like to draw the committee's attention to the fact that this document, Meeting Future Energy Needs, an initial review of the options, report 651SP, which was published last November and has been distributed quite widely, does give a good summary of the results of phase 1.

In addition to that, more recently, a more technical report, As It Needs To Be, was published in February of this year, report 652SP. That describes the first phase of the demand and supply options study in a more technical manner. That was necessary to get across fully what was being done.

Dealing first with the evaluation criteria that we consider, these include technical feasibility, long-term cost, financial impacts, risk and flexibility, resource availability, province-wide impacts and public acceptance issues. I would like to go through these one by one.

Technical feasibility: We believe the technology should be proven and practical when required. It should be accessible. It should have accessible primary energy sources, i.e., fuels or motive force, and it should provide the required reliability and quality of service.

Two examples are obvious and should be stated. Hydraulic generation is technically feasible in Ontario. On the demand side, insulation or higher efficiency devices to reduce demand are available in Ontario.

Long term costs: We believe cost is an important consideration for evaluating and comparing the merits of options. The cost of electricity in Ontario is comparable to that in other Canadian provinces and much lower than that in most of the United States. This benefits the province and Canada in general.

In our presentations to the select committee on energy last September, the cost evaluation techniques were discussed. These included the present value method and total unit energy cost. The present value method can and is being used for comparing options or plans with different cash flows but similar characteristics. It is still being used. The total energy cost method can only be used to compare projects with similar characteristics.

The task that we had in phase 1 was to compare options with very different characteristics, such as conservation, time of use rates and nucleargeneration. We have developed a technique we call standard costing in order to do this. As I think all members of the committee know, that was the technique used in phase 1 of the supply and demand options study.

The technique uses present value techniques, but allows comparison of options with different operating characteristics, different lives and different points of application. I will refer again to standard cost later.

3:20 p.m.

Under the heading of financial impact, the key questions arise of who pays and when. I think that was mentioned by one of the visitors from the United States yesterday. How much capital would customers have to put up? How would the average cost of electricity change? Will the cost be different to those who insulate from those who do not?

Impacts on the financial soundness of the corporation: These cannot be assessed for options in isolation and were not considered in our phase 1 studies. They will be considered in subsequent work.

Risks and flexibility: In any plan of action there are risks. These risks may be related to the project itself; hence, we call these intrinsic risks. They may also arise from the environment in which they are being implemented; hence, we call these extrinsic risks. Under the heading of intrinsic risks, we include underestimating the capital costs, be it for insulating houses or for building a generating station; delays in work schedules; and lower-than-expected technical performance or customer acceptance. Examples under the heading of extrinsic risks or risks not related to the project are load forecast uncertainty, fuel prices and the cost of capital.

The task is to recognize such risks and to take measures that provide appropriate flexibility to control costs, as well as to supply the demand for electricity.

Resource availability: All options, however attractive financially or otherwise, require manpower and management for implementation. Capital constraints can also affect the ability to implement programs.

We must consider province-wide impacts. Different options are expected to have varying effects on the provincial economy, the environment, health and safety and society.

Public acceptance issues: As you have already heard, we are considering the public acceptance issues related to alternative options and plans. We recognize public acceptance is necessary for the approval of plans. The public consultation programs, which will be described to you later, have been put in place to obtain opinions from members of the public.

I would now like to turn to the issue of standard costs. The standard cost of an option is a measure of the long-term cost in dollars per megawatt-hour for use of the option to provide for an increment of typical load. The standard cost evaluation method is a measure of the long-term cost. It does not address the other evaluation criteria I have just outlined. I think we made that clear in our discussions with all those with whom we have been in discussion.

The standard cost of conservation measures can be meaningfully compared to supply options, whether they are high operating cost peaking resources or base-loaded resources. The operation of the existing system is adjusted to account for differences in energy production. It is expressed in units of dollars per megawatt-hour of electrical energy. It is an average annual cost. Expressing costs on a unit basis enables the options of different sizes and different useful lives to be compared.

To ensure a common basis for comparison of options, the standard costs reflect costs to all the participants including Ontario Hydro, the municipal utilities, customers and private electricity producers. In other words, we are looking at standard costs from a broad society perspective. The costs are suitable for comparing demand and supply options since they capture the cost to both the utilities and customers.

As an example, the additional cost of cogenerating electricity at an industrial steam plant is factored into the standard costs, although the industrial customer may pay for these costs. Similarly, for the demand options, all the costs of additional insulation, as an example, are included, although the costs may be borne in whole or in part by the customer.

Standard costs do not explicitly include rate incentives, revenue loss due to conservation or payments for electricity purchases from cogenerator owners. These are money transfers among participants. Such transfers disappear when one takes the broad society perspective of standard costs. We believe this approach is consistent with the least-cost energy strategy that was being advocated at Energy Forum '86 that some of the members of the committee attended a few weeks ago. Further details, including numerical examples, can be found in the appendix to this section and in the report to which I referred a few moments ago.

To return again to standard costs being only a part of the full economic and financial evaluation, standard costs are useful for comparison of options based on long-term economics. In particular, the use of standard costs is good in situations where options with different characteristics require screening. We have considered many options.

Additional factors that are not included in standard costing also affect long-run costs. These factors, which are to be considered in more detail as the study progresses, include the amount of each option, the interaction between options and the timing and order of implementation. The impact of these additional factors on long-run costs and of the other evaluation criteria have to be evaluated in the decision-making process.

That concludes my presentation.

Mr. Sargent: On the standard costing, that is quite a formula. I do not know how you do that. When you work it out over the broad mix of nuclear and hydro, does it work out to a standard result? That is a silly question. Your formula for standard costing on page 20 is a measure of the long-term cost in dollars per megawatt-hour for use of the option to provide an increment of typical load. Is that your formula?

Mr. Hill: Yes.

Mr. Sargent: When you work it out, does it average out when there is the mix of nuclear and hydro?

3:30 p.m.

Mr. Hill: The presentation given by the chairman last fall illustrated in one of the slides both the standard costs and the amounts of each option that would be available by about the end of this century. It illustrated that a number of the conservation options and demand-management options were among the cheapest. It illustrated that nuclear was among the cheapest, but perhaps had only a limited amount available, in both cases, by the end of this century. It illustrated that hydraulic was among the cheapest.

Mr. Sargent: Thank you very much.

Mr. Chairman: We should move to some questions.

Mr. McConnell: Perhaps I can comment before you start. We will be presenting some substance having to do with demand and supply in our subsequent presentations. In the interests of efficiency, I suggest it might be better at this time to have questions that have more to do with the methods for the load forecasting that we presented in the presentations by myself and Mr. Hill.

Mr. Chairman: We will bear that in mind. I cannot guarantee that I can restrict it to those questions.

Mr. Gordon: I am sure the chairman will try to analyse whether this is a demand or supply question. I was intrigued by the last presentation made by Mr. Hill, particularly when he talked about demand and supply. After all, that is what this committee is all about. I was intrigued by the chart, figure 4C.5, where you point out that planned supply and required supply could be a problem in 1994 or thereabouts. I presume much of your forecast for 1994 to 2000 was based on the types of things that have been happening over the past decade. Over the past decade we have seen a downturn in the economies of the western world. It now seems to be turning around quite markedly. Falling oil prices and so forth give us something to worry about.

Will conservation and small water projects in northern Ontario, where you are going to drown all the Indian land, be the answer for the future? Is this the big nirvana to which we can look forward or am I asking the wrong question?

Mrs. Grier: You are asking the wrong people.

Mr. Gordon: Perhaps I should be asking you.

Mrs. Grier: Their answer is going to be no.

Mr. Gordon: I am curious. I have listened to people from California and wherever. Now I want to get down to brass tacks because we are into the last two weeks and I want to know what is going on.

Mr. Hill: I would like to give you half an answer.

Mr. Gordon: Before oil prices went down?

Mr. Charlton: Stop using brass tacks and start using nickel.

Mr. Gordon: We could talk about nickel, too, or Elliot Lake.

Mr. Hill: I emphasize that we have not finished the study yet. We have not finished the purchase negotiations yet. We deliberately chose, particularly Mr. McConnell and myself, to keep the examples we gave you as reasonably consistent as we could. They are not inaccurate. I am simply saying they are consistent by year with what we gave you last fall. Hence, we chose the year 2004 and we used the best available data.

It is possible that if load continues to grow faster than forecast by my colleague on the extreme left and my colleague on the right, we will have a problem with supply. That is possible. In the time available we are not discussing emergency measures, if I may call them that, such as we did some years ago when in a rush we dashed out and bought all the available gas turbines we could buy on the market and put them in for emergency peaking duty. For a while, we were glad we had them, but they are very expensive to operate.

We have tried to portray the information as well as we can on the basis of the normal increments we would make to the system. I should point out that these numbers do not include Little Jackfish, any output from Mattagami or the development of Niagara. If those go ahead, the supply numbers would be higher.

Mr. Gordon: The supply numbers would be high.

Mr. Campbell: Higher.

Mr. McConnell: In your question, did you refer to the year 1994?

Mr. Gordon: Yes.

Mr. McConnell: Mr. Hill has given you 50 per cent of the answer to your question. I will give you 50 per cent of the remaining 50 per cent.

Mr. Gordon: Very good.

Mr. McConnell: As Ms. MacKay-Lassonde has pointed out, the future is uncertain. We have to do the planning in the face of that uncertainty. You expressed some anxiety about 1994. There is an interdependence between electrical supply and what the economy in North America can achieve. Certainly, if between now and 1994 the economy were to move as it has during the past three years, we would without question fall short of electricity.

On the other hand, there is an interdependence there. To some extent the economy cannot move without the electricity supply. That applies particularly to the United States. Our economy is heavily locked in to the elephant to the south. We do not want to be seen as saying, "We are forecasting there is going to be a major shortage." We are not saying that at present, but we are in a situation where the future is uncertain. In other words, we do not want to be caught crying wolf, but at the same time we do not want to mislead you that everything is milk and honey.

Mr. Campbell: Perhaps I can add a point.

Mr. Charlton: Is this the last 25 per cent?

Mr. Ashe: Here is the other 25 per cent.

Mr. Campbell: Yes, it is the other 25 per cent.

Our major customers, and they may be presenting briefs here, have formally expressed that they believe we are in danger of undersupply of power in that time. They are worried about that. They are also concerned about costs because they have to be competitive. They would not advocate something that was going to be more costly than is necessary because they know they are going to have to pay. They are worried we are going to be short.

We believe this demonstrates we are not oversupplied. People who say we are oversupplied are not looking at the facts. You asked about small hydraulic and conservation. We do not want to jump to conclusions, but we believe we can get major gains from more efficient use, the equivalent of a Darlington and maybe more. We will bring on all the small hydraulic we can, but the numbers are not large. If we brought on all the small hydraulic, it would not operate one new General Motors plant in Oshawa. As I mentioned, we are sure we are going to have to look for other sources of supply. Those are the choices we are going to be facing in the next two years.

Mr. Gordon: Was the General Motors plant that is going to come on stream part of your planning forecast?

Mr. Campbell: No.

Mr. Gordon: What load forecast do you see as a result of a plant of that size? How much does that increase things in that area? Have you any idea? I know it is a rather specific question.

3:40 p.m.

Mr. McConnell: You ask whether that was part of our planning load forecast. If you take the time horizon of 10 years, the answer is it was not, but if you ask whether it was in the planning horizon of two years, the answer is yes. In other words, there is always a point at which we get to know that we can expect a load to come on. The point that was emphasized in this morning's discussion was that we get relatively short notice on the part of our customers. For example, your wife might decide next week that she wants a microwave oven in her kitchen. We would not have specifically forecast that, but we would have taken it into account.

Mrs. Grier: Maybe he will decide he wants it.

Mr. Gordon: Actually it was a surprise for Christmas.

Mr. McConnell: Maybe he wanted it.

Mr. Rothman: I am Mitch Rothman, chief economist at Ontario Hydro. Since we are talking about the economy and load forecasts, I want to make two points, especially when we talk about such things as the GM plant.

First, I do not think our current economic forecast is essentially a pessimistic one. We have come through a recession and we have come out of it. Our forecast for economic growth for the next 10 years is that it will be better than it was in those bad days of the late 1970s and the early part of the 1980s, and that it will be about what it has been in the first half of the 1980s, about the average of 1981 to 1985. Clearly, that is not as good growth as we had in the 1960s and the early part of the 1970s before the oil crisis hit. None the less, it is not a bad, slow growth forecast. Second, although we do not account specifically for such things as the GM plant in our load forecast, we have a forecast that we will have some economic growth and part of that economic growth comes from the GM plant. It would not happen if such things as the GM plant were not going in.

That is the virtue of an econometric kind of forecast. We look at those aggregates. We know there will be some aggregate growth. We cannot tell 10 years in advance that there will be a GM plant in Oshawa, but we know that if 10 years in the future we have had three per cent growth over those 10 years, there will be things such as those GM plants in Oshawa. Essentially, that is how they are in the load forecast now. As Mr. McConnell said, over the short term, if we get two years' notice we can put it in explicitly.

Mr. Gordon: Further to that, in the presentation by Ms. MacKay-Lassonde, I notice on page 18 in figure 4B.12 that the Canadian utilities' own load forecasts, 1985 to 2000 annual growth rates, show Ontario at 2.6 per cent. I presume that comes from Ontario Hydro.

Ms. MacKay-Lassonde: That is right.

Mr. Gordon: That load forecast seems to be quite conservative in comparison to those for some of the other provinces such as Nova Scotia,

Newfoundland, Alberta and so forth. Unless I have misread this chart, you can hardly be accused--

Ms. Mackay-Lassonde: That is the point we are trying to make. It is conservative.

Mr. Gordon: Extremely so.

Ms. MacKay-Lassonde: We feel we are not showing--

Mr. Sargent: That is an awful word.

Mr. Gordon: We do not use that. We use "extremely modest."

Ms. Mackay-Lassonde: That is right.

Mr. Gordon: It has been almost a year now. We do not think of it in those terms any more.

Ms. Mackay-Lassonde: It is not an inflated forecast.

Mr. Ashe: It is not a liberal one.

Mr. Gordon: It hardly seems inflated. I was curious.

Mr. McConnell: Another way of putting it is that Ontario, relative to other Canadian utilities, has a lower forecast. When you start using the word "conservative," and I am not talking politically, you have to remember that could get us into trouble if it turned out to be too low. Basically, it is better to say that 2.6 per cent is our genuine median forecast, but we recognize that it could be well below that or well above that. If we were well below that, there would be no risk of our having a shortage of power and we would be concerned about oversupply. If we were very much above that, we would be worrying about being able to meet the needs of the province, which would restrain the economy.

Mr. Gordon: Given that electricity and growth go together, with Quebec at 3.2 per cent and with a Liberal government there, does that mean things are going to turn around there? You do not have to answer that question. I find it very hard to believe that those four provinces you have at the top will be growing faster than us in the next four or five years. You do not have to answer that either.

Mr. Rothman: One factor they may be driving at is that they are forecasting faster growth in their energy-intensive sector than we are, not faster economic growth but faster growth in those industries that use electricity intensively. Our forecast says that we expect electricity growth to be slower than GPP growth, a forecast of a turnaround in the pattern we have had for 20 years. We first made that forecast two years ago when we had not had any experience of a year like that. It gives us some comfort that we have now had two years of electricity growth that is slightly slower than overall economic growth.

Ms. MacKay-Lassonde: Perhaps I could mention another thing. You have noticed that in the presentation I made, for example, 20 years ago we had a percentage growth rate of seven per cent but the base was much smaller. Those other provinces have a base much smaller; therefore, the increment, even

though it is more than ours, represents a larger percentage. We have to be careful when we look at percentages.

Mr. Campbell: One pulp mill in Newfoundland could skew it.

Mr. Gordon: I understand that. I see your point.

Mr. Sargent: In your summary, you were saying that you view with alarm the fact that two years down the pipe we will not have enough. Are you not thinking of interconnecting with Quebec and Manitoba? There is 12,000 capacity in La Grande Complexe, 6,300 in--

Mr. Campbell: Conawapa?

Mr. Sargent: Yes. You are not figuring those Hydro--

Mr. Hill: Presentation 6 by Mr. Meehan will deal with possible purchases from Quebec and Manitoba.

Mr. Sargent: Why do you not get those guys in your pocket now?

Mr. Hill: It is very difficult to get those guys in my pocket, Mr. Sargent, I can assure you.

Mr. Campbell: We are negotiating with them. We have signed a letter of intent with Manitoba and we are also negotiating with Quebec, but it is a question of price and the reliability of the contract.

Mr. Sargent: You could put another Niagara down. You are going to work on that too, are you not?

Mr. Campbell: Yes, but that will be a redevelopment of a plant; it is not a lot of new power. We will get better use of that power, so we will produce a few hundred megawatts additional power, but it is not all new.

Mr. McGuigan: How about the old Toronto station?

Mr. Campbell: That is closed and we are using that water in the Beck power station now.

Mr. Sargent: You do not view the situation with alarm then. You are okay.

Mr. Hill: I was merely trying to point out that in the assumption on the supply side, we have not included any firm sales and we have not included any firm purchases. We are still negotiating for firm purchases.

Mr. Campbell: We do not view it with alarm. We are saying it is a serious business and there are some very serious decisions facing us. That is what we are saying.

Mr. Sargent: Thank you.

Mrs. Grier: I have some questions on Mr. Hill's last presentation on the standard costs, if I might. Are environmental or social costs factored into your compilation of standard costs in any way? If so, on what basis?

Mr. Snelson: May I deal with that, Mrs. Grier? My name is Ken

Snelson. I am the assistant to the director in the system planning division.

As far as environmental costs included in the standard costs are concerned, some costs are internalized and included and some costs are not. For each option, the included costs are those we can identify that will mitigate the environmental effects and make that option as environmentally acceptable as we can.

Mrs. Grier: In other words, would coal include scrubbers or would coal include the standards to which existing coal plants are built?

3:50 p.m.

Mr. Snelson: In the case of coal, the costs are included of sufficient amount of sulphur dioxide control that there will be no increase in acid gas emissions because of that option--not just 80 per cent of the emissions of that option, but no increase. In that case, there is a full inclusion of the environmental costs of coal with regard to acid gas emissions.

Mrs. Grier: When I look at the example in table 1 of standard cost calculations, I do not understand, on the first one, "additional fuel costs on system." I see oil, coal and nuclear there. Why?

Mr. Snelson: For the benefit of the committee, we are looking at a table which has the standard cost calculations. Are you referring to the conservation option at the top?

Mrs. Grier: Right.

Mr. Snelson: This is conservation in a new house where you are putting in improved insulation and control of ventilation so that less heat is required. What happens here is that the standard cost is the cost of supplying a normal increment of load. That is an increment of load that occurs both in the winter and the summer. By saving energy due to insulation, you can save energy in the winter and you can meet peak requirements of the new load by the insulation. It can free up capacity to supply a new peak load and it can reduce the energy demands of the system in the winter. However, there will be requirements in the summer as well and the insulation does not help meet a new load in the summer because there is no heating load in the summer.

Mrs. Grier: Therefore, those additional fuel costs are--

Mr. Charlton: Would it not affect the air-conditioning load in the summer as well, though?

Mr. Snelson: If the house were air-conditioned, it could affect the air-conditioning load in the summer, yes.

Mrs. Grier: Therefore, those additional fuel costs are the costs attributable to a new house taking into account special conservation and insulation measures. If I were looking at a similar calculation for a standard nonconservation-conscious house, would the fuel costs to the system be greater?

Mr. Snelson: This is a standard cost. It is the cost of meeting an electricity requirement from the system. It is the cost of meeting an increase in the electricity demand by our customers. One way of meeting an increase in the electricity demand is for some customers to use less so that other

customers can use more. You cannot do a standard cost calculation if there is no energy saving and there is not any saving to be costed.

Mrs. Grier: I fail to understand why in your calculation of the standard cost of conservation and one new house there is, as part of that cost--I assume the cost is your 30.3 figure at the bottom of that calculation--the cost for oil, coal and nuclear. I thought I was beginning to understand that you were telling us that those costs are less than would be the costs attributable to a nonconservation house, but you are not saying that, I take it.

Mr. Snelson: No. I am saying that if there is an increase in demand--

Mrs. Grier: If there is one new house built?

Mr. Snelson: Let us say there is an increase in demand; somebody installs a motor or something in an industrial factory. In order that we can supply that demand, which is going to occur winter and summer, I am going to encourage somebody else to save energy by installing some insulation in the house. That insulation in the house will save the energy that is required by that motor in the winter but it will not do anything to enable an additional supply to be made available in the summer. In the summer, we have to supply that by running existing generating plants which may consume other fuels, including oil, coal and nuclear fuel.

Mr. Hill: Could we refer, Mrs. Grier, to the figure--

Mrs. Grier: I thought this was reducing everything to a standard level by which I could compare the advantages of conservation, nuclear and hydro.

Mr. Hill: Yes.

Mrs. Grier: You are now telling me that in order to arrive at a standard figure for conservation, you have to charge to conservation costs of nuclear, oil and coal.

Mr. Snelson: The same thing happens with peat and hydraulic.

Mrs. Grier: How can you make them all comparable if you are making assumptions about the impact of one on another?

Mr. Snelson: They are made comparable by comparing them for doing the same job. Clearly, a peaking hydraulic plant that runs for a few hours in the winter on peak periods, that runs for a lot of hours in the spring when there is a lot of water in the river and that is shut down most of the summer when the river is nearly dry is doing a different job from a nuclear plant that is operating day in, day out, 80 per cent of the year.

Mrs. Grier: I see. You are weighting the options in relation to their contribution to the system.

Mr. Snelson: We are adjusting them so that they do the same job. A job that we have chosen is to supply an increase in demand of the normal load shape.

Mr. Hill: Mrs. Grier, perhaps to make it clear, if we had a higher

load factor conservation contribution, then it would not have these costs.

Mrs. Grier: Yes, if we had a higher load factor, but the object of the exercise is to compare apples equally with apples as opposed to apples with oranges. It sounds to me as though you have reduced it all to apples and bananas or something. You have just made a different variable in there. That all comes back to the assumption in your report that conservation can only be considered as a shaving of the peaks, not as a base-load contribution.

Mr. Snelson: I think Mr. Hill made the point there, Mrs. Grier, that if you were talking about a conservation option such as an improvement in the efficiency of a motor in an industrial factory that was working 365 days of the year, then that option would actually get a credit from less fuel use on the system. That is because it would produce additional power in the summer that could be used to reduce fuel demands in existing generating plants. It depends on the load factor of the option, whether it is a supply option or a demand option.

Mr. Charlton: Let me ask a supplementary on that, assuming the scenario you have set out, that the envelope on the new house is only having an impact in the winter. I think that is not an accurate assumption; either extreme is likely inaccurate. There are some houses that are air-conditioned and there are others that are not. When I walk up and down my street in the summertime, the vast majority of the homes are using air-conditioners. They are not the most efficient kind, but that is another question altogether. We can come back to that.

I am just trying to recall, and I cannot recall, the difference between the winter peak and the summer peak. If the enveloping of the house is reducing the difference between the highest peak and the second-highest peak and nothing else, why are you counting additional fuel costs in there to account for base-load operation?

Mr. Snelson: I am sorry, I do not think I fully understood your question.

Mr. Charlton: I am going back to Mrs. Grier's question about why you are adding fuel costs to this conservation measure. You said that if a conservation measure were available all year round, you would give a fuel credit.

Mr. Snelson: Yes.

Mr. Charlton: If the conservation measure also reduces your peak or your need for seasonal peaking capacity and therefore that conservation measure eliminates the need to run a plant, should it not also get a fuel credit?

Mr. Snelson: The peaking credit is automatically included in the standard costing technique.

Mr. Charlton: In what way?

4 p.m.

Mr. Snelson: In deciding how much of an option is required to meet an increment in demand you ask, "How much peak demand can it meet?" The standard cost is the cost of supplying one kilowatt in increased peak demand.

That is the cost you are calculating. It is the cost of the peak demand and the energy demand that goes with that at normal load factor.

In the case you were quoting, where you were talking about the envelope of improvements that affected both heating and air-conditioning load, that would have a higher energy saving due to the conservation and that would reduce the additional fuel costs that are shown in this example.

Mr. Charlton: In a house like mine, where I have been gradually making improvements over a fairly long period, but where my hydro bills are essentially running constant all year, the improvements are going to get a fuel credit as opposed to the fuel cost here.

Mr. Snelson: Are you in an electrically heated house?

Mr. Charlton: No.

Mr. Snelson: So you are talking about improvements in energy efficiency of appliances and--

Mr. Charlton: No. In the wintertime, I have hot water heat and in the wintertime I have electric pumps running all the time. Those are electrical energy uses.

Mr. Snelson: If you were to be saving energy all year and it were a constant level all year, it would show a fuel credit.

Mr. Charlton: As I have said, the improvements I have made in my house have generally reduced both my oil bills and my hydro bills overall. Ever since I bought the house, when it was much less energy efficient than it is now, my hydro bills have always tended to be fairly constant throughout the year. They are slightly higher in the winter but not much.

Mr. Snelson: This is an example for heating which tends to be seasonal. The other applications for appliances, such as refrigerators and washing machines which we use constantly through the year, tend not to have this seasonal characteristic and so they would have a different set of proportions when you do the standard cost calculation.

Mr. Charlton: Both Mrs. Grier and I talked about simplistic approaches to complex problems. I think we are both saying that it is a little simplistic to say that because it is wrapping a house, it does not have an impact all year. That is one of the reasons we have to look more carefully at end use.

Mr. Snelson: Clearly, something that is saving on your heating demand, and if you do not have air conditioning, is a winter saving and not a summer saving. That is a very simple, basic fact.

Mrs. Grier: I understand how you are doing it. That was where I started from.

Mr. Hill: I agree with the comment you just made. I think it has to be emphasized to this committee and to everyone else who looks at it. On page 5, it says: "The standard cost is a simplified way of comparing diverse options on a common basis. It is a useful tool for an initial look at demand

and supply options so that a general assessment can be made of relative long-term economics and ranking from the cost point of view."

For every one who has looked at this, we have tried to caution them exactly as has been said. It is not the answer that we need through the rest of the pages of the study.

Mrs. Grier: Is this a Hydro-developed costing system or is this being used in other systems and in other power planning?

Mr. Hill: I think we have developed it, but it has been used in some others.

Mrs. Grier: So the formula is yours, not anybody else's.

Looking at the evaluation criteria you gave us in the beginning of this presentation, is there any weighting involved in the examination of those criteria?

Mr. Hill: At this particular time, Mrs. Grier, we were identifying the criteria. Mr. Snelson has indicated in response to an earlier question that certain things such as environmental costs are explicitly taken into account. Where it involves hardware going in and so on, those are embraced to produce what might be an acceptable environmental impact.

With regard to what you might call social values, let us suppose you said: "When you have all finished putting your scrubbers into the coal plant, as a member of society, I would be prepared to pay. Let the cost go up in Ontario by five per cent in adopting hydraulic renewable resource rather than coal-fired." That is not taken into account here. We will be asking you for such value judgements and that kind of thing.

Mrs. Grier: How are you going to weigh such a value judgement against technical feasibility? Are all of these criteria given equal weight or are some more equal than others?

Mr. McConnell: At this particular point in the phase 1 studies, we have not superimposed any value judgement.

Mrs. Grier: How do the criteria that you are using in this particular study differ from those you would have used in previous studies when you were merely looking at it from the supply side?

Mr. McConnell: First, you said we were only looking at it from the supply side; we will be making presentations to you indicating that we have been looking at demand for a long time.

Mrs. Grier: For example, when you decided to build Darlington, did the criteria that you used in your evaluation of that method of meeting demand vary from those you are now using?

Mr. McConnell: When an evaluation is ultimately completed and information goes forward, we communicate to our board of directors what all of the explicit costs are. We quantify, to the degree that we are able, some of these other factors that require value judgements.

For example, if we look at an option that meant it was going to provide employment in Ontario and another option where the majority of employment is

in the United States, we communicate that to our board of directors so that the costs and these other social factors can be looked at on the basis of their own merit. That is also communicated to the government.

In the recent past, that has not been a major problem. If we use the example that you were talking about between two supply options, we have been in the fortunate position that in the recommendations we have had the least costs happened to have favourable characteristics also that required those balance factors; that is not necessarily always the case.

Mrs. Grier: I have some questions on Ms. MacKay-Lassonde's presentation. I was interested to hear you say that the world is no more uncertain now than in the past. Certainly, some of the other presentations have emphasized that the degree of uncertainty in energy planning has increased more in the past decade than it did the decade before. I wonder what led you to this conclusion?

Ms. MacKay-Lassonde: This is an assumption that we make when using the statistical technique to develop the band forecast. Essentially, we use past error. We analyse those past errors to forecast the band of error that we can expect in the future. We have to make some kind of assumption and we make the assumption that the future will not be more uncertain than it has been in the past.

Mrs. Grier: When you look at the adjustments that you have made to your forecasts for demand over the past 10 years and the variations that have occurred as demand has come down from the seven per cent, you are assuming that in any future forecasts of demand there may still be that same degree of adjustment to be made as time goes on.

Ms. MacKay-Lassonde: In fact, it is more than 10 years; we look at 25 years of data. We look at the errors that we made in our forecasts in each one of those years, whether the forecast was one year, two years, three years--we go up to 10 years. Less than five years ago, we made 10-year forecasts rather than 20-year forecasts. When we analyse those errors in a statistical way, they are used then to project our forecasts. All those answers that have been experienced over the past are reflected in this band that we are projecting for the future.

Mrs. Grier: Other utilities seem to have based some of their planning on an attempt to reduce the amount of uncertainty. I am wondering whether that has been a consideration in any of your planning?

4:10 p.m.

Ms. MacKay-Lassonde: I have looked at the way other utilities are dealing with uncertainties. In fact, I have looked at all of the Canadian utilities; none of them does it the way we do it. They produce a scenario and they are very reluctant to give any probability of the actual demand being within that band. We also produce band scenarios--the scenario approach. The one I am talking about is essentially a statistical band.

Mrs. Grier: Has the width of that band changed over time, or were the kinds of forecasts you were making 15 years ago still within that 60 per cent band?

Ms. MacKay-Lassonde: I have not looked. It should be fairly consistent. One thing I can tell you; I have looked at our band with some

others. I have taken the ratio of that band to the actual demand in 1985, so I have compared the ratio of several utilities and they are very similar. We are not any wider or narrower than anybody else.

Mrs. Grier: I have made myself a note on page 18, but I cannot remember now what my question was; I had better look at page 18. I guess it was that question of the range.

The whole advantage of what has been termed a "mixed portfolio of resources" is something it has been emphasized that other jurisdictions are attempting to develop as a way of coping with this uncertainty.

Ms. MacKay-Lassonde: Probably what you are referring to is the scenario approach, where you look at various alternatives and how you would meet those alternatives. That is also referred to as "backcasting" in terms of forecasting. We have not done that. We believe in forecasting rather than backcasting.

Mrs. Grier: You do not see any advantage in having a range of options that includes perhaps smaller incremental increases in supply rather than a major nuclear generating station, for example?

Ms. MacKay-Lassonde: We believe in the scenario approach. It helps the forecasters in seeing the alternatives they could be facing 15 or 20 years from now. That is why, besides the band of uncertainty, which gives them at least a probability, we also provide them with scenarios. They can plan for those various alternatives, whether for low growth, high growth or stagflation growth.

Mrs. Grier: You see no prospect of narrowing that band and being able to plan with a little more certainty than we have in the past?

Ms. MacKay-Lassonde: We have tried. We are looking at ways of increasing the confidence within that band. So far, we have not come up with anything conclusive. We are working on that.

Mr. Rothman: Mrs. Grier, the problem is that the world is uncertain. We as forecasters might think we can narrow the band of uncertainty, but the degree of uncertainty the world imposes on us is out there. It is our job as forecasters to try to make the best guesses we can about how wide that band is or how narrow it is. We would be doing a disservice to the planning function to say that the world is more certain than the evidence we have makes it appear to be.

You suggested the world might be becoming less certain than in the past. The preceding 15 years, say, from the early 1970s through to now, have been periods generally of pretty rapid change in economic conditions. We had our all-out boom from the early 1970s through to about 1973--one of the last all-out economic booms we have had--followed by the oil crisis and periods of very slow growth, followed by some slow recovery in the early 1980s, followed by the very severe recession of 1982, followed by the strong recovery we have gone through since then. That is a period of fairly great variance in economic activity. As a result of fairly high variance, there have been fairly high errors in the load forecast. Our forecast of the future band width reflects that degree of uncertainty.

As Ms. MacKay-Lassonde said, we also go back 25 years. To some extent we reflect as well the period from 1960 through 1970, which was one of fairly

steady growth over a long period of time. In the assumption, to say that the future is no less variable and no more variable than it has been over that 25-year period, it seems to me is about as good an assumption as we can make.

Otherwise, as Mrs. MacKay-Lassonde has been saying, what you have to do is to say, "If there is some significant deviation from our current forecast in the future, it is going to be due to some basic cause." It could be due to a basic cause such as the Canadian and United States governments getting their policy acts together so we have much stronger growth. It could be due to some basic cause such as their failure to get their policy acts together so we have much weaker growth. It could be due to some basic cause such as we have successful reindustrialization or a restructuring of the industrial sector of the Canadian and US economies so we get much stronger growth. We have to make some assumptions such as that and describe those futures in order to say we know something more about them.

We do that and we give the planners fully worked-out visions of what those futures would be like. However, we do not think those are the best way to forecast those uncertainty bands. We think the best way is to make the assumption that we have.

Mrs. Grier: Does an end-use model make it any better?

Mr. Rothman: No.

Mrs. Grier: Why not?

Mr. Rothman: It does not tell you anything about what kinds of alternatives there are. In an end-use model, you have to know something about what kinds of levels of activity there are going to be. That is the basis. Then you ask, "How much electricity does that activity use?"

Mr. Charlton: And, "How much should it use?"

Mrs. Grier: Do you have sufficient data to do an end-use model that gives you an entirely accurate picture of the uses that are now being made?

Mr. Rothman: An entirely accurate picture? No.

Mrs. Grier: Have you gained any sophistication or greater accuracy in your end-use model over the last 10 years?

Ms. MacKay-Lassonde: Perhaps not over the last 10 years. We have had the end-use model only since 1980. Over the last two years, we have done a lot in terms of updating and getting the best information available on end use.

Let me take this opportunity to come back to the errors. I told you that the way we forecast this band is to look at the errors we have experienced in the past. One of the things we have seen in the last couple of years is that our errors are getting smaller in comparison to what was happening in the mid-1970s. That had an impact in our band to the extent that it made it a little bit narrower but not very much because we are getting 25 years of data.

One alternative to reduce this band of uncertainty would be arbitrarily to give more weight to those later years, supposing we are getting better because we have more information. In my opinion, it would be very arbitrary. We do not have any strong, logical basis to justify using that kind of weight.

Mrs. Grier: On what basis have you improved the end-use model since you began using it in 1980?

Ms. MacKay-Lassonde: What I can tell you about the end-use model relates only to the last two years because that is the time I have been in the load-forecasting business. We have revised our assumptions. We have looked at a data base in terms of the residential and commercial sectors. We have worked with the Ministry of Energy and compared our assumptions and data. We have updated our data and I think we have now pretty much finished looking at the idustrial sector. We have put a lot of effort into our end-use model.

Mrs. Grier: Has that improved the accuracy of the forecasting?

Ms. MacKay-Lassonde: We have more confidence in the forecast that is coming out of the end-use model by comparison to the confidence we had in the model two or three years ago.

Mrs. Grier: Has it been more accurate? Have you required fewer adjustments? Have you forecast more closely the actual demands as a result of using the end-use model?

Ms. MacKay-Lassonde: We have to be careful with the end-use model. When end-use modelling started, it was essentially geared to short-term forecasting. In fact, it was geared for marketing purposes.

Now we are extending the end-use model to 20-year forecasts. That means we will be missing some breakthroughs in technology; so we have to be very careful. That is why we are using an econometric model right now. We combine an econometric model with an end-use model so that we can tie up a forecast of the economy with an end-use forecast or technological progress. That is essentially the direction we have been taking.

4:20 p.m.

Mr. Rothman: The short answer is that the end-use forecasts we have been making have been relatively long term, and we have only been playing with this. Ms. MacKay-Lassonde has been improving it for only two years; so we cannot answer the question yet. We just do not have the data.

Mr. Campbell: May I add just one comment? I was the Deputy Treasurer of Ontario and the Deputy Minister of Treasury and Economics in 1982, when we were being told at meetings such as this that our automobile industry was going down the drain. We might as well forget it and we should be writing it off. We should be--what do they call it?

Mr. Rothman: Rationalizing it.

Mr. Campbell: We should be rationalizing it, making adjustment payments to retrain these workers because they were all going to be unemployed. It was all gone. We were told by experts about that.

That was only four years ago. Put yourself in the position of trying to construct an end-use model. Who could have forecast then that in the interim we would have between $4 billion and $6 billion of investment committed in the automobile industry in Ontario?

Mrs. Grier: It was as a result of direct government intervention.

Mr. Campbell: If you had constructed an end-use model based on the assumptions that everybody was making then, you would have been way off. What we are saying is that it is not possible to see the future. What you have to have is a band, a range of options. You hope you provide for a realistic growth in your economy and not blow it and turn away those kinds of investments when they come around.

Mr. Chairman: You go first, Mr. McGuigan. Then we have Mr. Snell, Mr. Haggerty, Mr. Charlton, Mr. McGuigan and Mr. Sargent.

Mr. McGuigan: Just to put a bottom line on it, I would ask the economist, did you forecast the 1981 recession?

Mr. Rothman: No.

Mr. McGuigan: Neither did anybody else, and yet it happened. My point is that I do not believe you can forecast any more than I can what the economy is going to be in the next three years, and I am not an economist. These events happen. You look back at it, as Mr. Campbell says, and you ask: "What the hell went wrong? What happened?" The record of forecasters has been dismal. What you are really doing in projecting your use of hydro is assuming that things are going to go on reasonably well. These other events that could be on the horizon could just be thrown into a cocked hat, could they not?

Mr. Rothman: That is precisely why we use band-width forecasts and precisely why we provide alternative scenarios.

Mr. Haggerty: Is that Band-Aid?

Ms. MacKay-Lassonde: Band-width.

Mr. Rothman: Band-width forecasts.

Briefly, without trying to be an apologist for the economics profession, which, Lord knows--

Mr. Chairman: You are cutting me off. Go ahead.

Mr. Rothman: Just briefly, the economics profession generally did forecast the 1981-82 recession, except it forecast the recession for 1979, which tells you something about the relative problems of three-year forecasts versus 15-year forecasts.

Mr. McGuigan: Anybody could forecast on a 50-year cycle. The Russians did it years ago. You could take any time between 1979 and 1983, based on 200 years of examples, and come pretty close.

Mr. Snell: How many people do you have working on end-use models now?

Ms. MacKay-Lassonde: I have three people working on end use.

Mr. Snell: Not all of them full-time?

Ms. MacKay-Lassonde: I have three people essentially working full-time on end use.

Mr. Snell: Is it your intention at some point to use the end-use model as your primary forecasting model?

Ms. MacKay-Lassonde: We do not use any model as a primary. That is not our intention. We use both econometric and end-use models, and then we generate our forecasts. That is what I was saying. We look at the results, we analyse them and we discuss them. As a matter of fact, we also present them to other forecasters in the community.

Mr. Snell: Has it not been your econometric model that has produced the results closest to the forecasts you use for planning purposes?

Ms. MacKay-Lassonde: We have used the end-use model. The econometric model was probably the primary model in the past few years because of some of the problems we had with end use, but the end-use model has been considered very seriously.

Mr. Snell: I appreciate that. Using your own words, do you intend to use the end-use model as your primary source of forecasting in the future?

Ms. MacKay-Lassonde: My objective is to use both econometric and end-use models. Neither is primary. What we do is look at the results. We analyse them and get the information on customer behaviour from the econometric model. We use the efficiency improvement and natural conservation from the end-use model. Then we produce our own forecast where we reflect our experience and judgement.

Mr. Rothman: Actually, the models we have coming from EPRI have an econometric component. They require econometric activity forecasts.

Ms. MacKay-Lassonde: That is in the two new ones.

Mr. Rothman: The two new ones we have ordered from EPRI.

Mr. McConnell: When you consider our planning horizon of 20 years, you have to remember that if you are talking about one year from now, there will be very few new products that consume electricity that will come on the market and penetrate the market in that one year that will create a large error as far as end use is concerned. When you talk about 20 years into the future and you are making a forecast, you have to remember there are many electrical devices that have not been invented yet.

For example, we talked this morning about heat pumps and about making heat pumps more efficient. Your conclusion might be that this will result in less demand for electricity Do not be so easily misled. It also makes that application more competitive. That, basically, can in fact cause the demand to go up. If you make it more competitive by making it more efficient, the demand can go up.

If you went back prior to the mid 1970s when we did that research and you went back 20 years, we were not even talking about doing that research at that time. We may very well be successful in developing a plasma arc for making steel in Ontario and that is not in place yet and therefore will not be in an end-use model accurately. Microwaves were not thought of as having major market penetration. In 1950 we were not forecasting that in 1970 transistors would have taken over and that vacuum tubes would have gone.

When you talk about end use, it is not some perfect thing that is the

answer to all forecasting. It is a contributor. It has to be looked upon as contributing to the forecasting process.

Mr. Charlton: That raises another question that goes back to your approach to standard costs. You are right; technology changes and generally some changes will reflect efficiency, such as tube to transistor, microwave and any number of things that have improved over the course of the last 30 years. Technological improvements are happening much more quickly in 1986 than they were in 1950.

Mr. McConnell: If you were born after 1940, you might have that impression. On the other hand, if you had lived from 1900 to now, you would find that our grandfathers made much faster progress in efficiency than we are making today. If you take an electric motor and it happened to be running at 20 per cent efficiency and you can buy one today that is running at 96 per cent efficiency, you have only four per cent left to go. There were major changes in improvement of electrical efficiency during the course of this whole century. If somebody comes in from the United States and tries to tell you that efficiency was invented in 1979, I could not think of a more misleading statement. It is an insult to our forbears.

Mr. Charlton: I do not think anyone is trying to suggest that.

4:30 p.m.

Mr. Campbell: I cannot resist this one point. You are saying there are some efficiencies, and that is true and we are trying to encourage that. At the same time, as our society grows in affluence, the public demand for more appliances that use electricity is increasing all the time. The average home now uses much more. It uses it more efficiently, but it uses much more because we have videocassette recorders, self-cleaning ovens, frost-free refrigerators and freezers. When I was a kid, our house had none of those. I suspect a lot of people in this room are the same way. It just added up.

If you ask our customers what they want, they say: "We want more of those things. When we can afford it, we want air-conditioning. We want another television. We want all these things." The customer demand is there and it is going to increase. That is the price we pay for affluence. It is going to increase. That is why I do not hold with the idea that we should have laws or regulations that limit the freedom of our customers to choose what they want to do. We have to encourage them to act more efficiently, but I think it would be a serious mistake to try, as was mentioned earlier, to legislate what people can have.

Mr. Charlton: It is not a question of legislating what they can have. It is a question of legislating the standard to which what they can have is built. We legislate emission regulations for automobiles, do we not? Do you think we should not?

Mr. Campbell: No, I agree with that.

Mr. Charlton: There are all kinds of things such as those that should be legislated. That is not what I was getting at. To what extent in your approach to standard costs are you updating those standard-cost developments as technology changes? How often do you do that?

Mr. Snelson: Can I give you an answer to that, Mr. Charlton? The standard costing has been done, as far as we can, assuming cost levels that we

project are likely to exist in the year 2000. We are projecting changes in costs as best we can to that time period. An example is that for photovoltaic cells, which are quite expensive at present but where there is a projection that the cost will come down substantially, we are assuming that by the year 2000, in today's dollars, the cost of photovoltaic cells will be down to about $1,100 a kilowatt compared to today's price of about $8,000 a kilowatt. Where we can see significant change in technology taking place and there is some reason to project that it will continue, we are doing so. As anybody can tell you, it is very difficult to predict all these things for the future.

Mr. Charlton: As a base-line example, we have talked a number of times about water heaters. I think we all know that electric water heaters consume a fairly substantial amount of electrical energy in this province because of consumer preferences and consumer choice to have a hot shower as opposed to a cold shower. Mr. Campbell mentioned this morning in his presentation that he remembered when water heaters were just bare metal. They were not insulated at all. We now have insulated water heaters, but out there we have people producing insulation jackets to put on water heaters, which means that we have not anywhere near achieved the efficiency that we should have achieved in water heaters.

Have we looked at the costs of doing what could be done with water heaters and the impact that would have on the hydro system?

Mr. McConnell: Are you talking about whether we are running with an optimum insulation thickness today, as distinct from 1933?

Mr. Charlton: No, as distinct from what we now know is possible.

Mr. McConnell: As we indicated this morning, the tradeoffs have to be made continuously in the light of our latest knowledge. There is a tradeoff there. The higher the cost of energy, the greater is your incentive to increase the insulation thickness. On the other hand, you do get to the point of diminishing returns. The loss of energy from water heating systems today is relatively small compared with the uninsulated tank. Yes, possibly there are opportunities for further improvements, but the opportunity is small compared with when we first introduced the insulation back in the 1930s.

Mr. Charlton: Again, there were not as many water heaters in the 1930s, so the per unit gain may be substantially smaller. The overall energy gain across the province may be substantially larger.

Mr. McConnell: Yes, but nevertheless Ontario Hydro was promoting conservation in the 1930s. It was motivated to go out and do this research and it implemented it.

Mr. Charlton: My simple point is that we have people out there marketing jackets; they are selling them. They would not continue to sell if there were not some saving as a result. Have you analysed the kind of saving you are capable of getting and looked at its cost-effectiveness?

Mr. Hill: Can we defer that question to Mr. Palmer tomorrow?

Mr. Charlton: Sure.

Mr. Hill: He will deal with it tomorrow.

Mr. Haggerty: I was thinking, with some of the questions that were

asked, we were looking for Hydro to have some profit, but I do not think we see that. I understand now that you have a new forecaster. Is it Mrs. MacKay?

Ms. MacKay-Lassonde: MacKay-Lassonde.

Mr. Haggerty: Maybe we will have better luck with a woman's touch.

Some discussions were raised concerning the General Motors plant and the new technology that will be put in place in that facility. It is just like the steel industry and the new technology in processing nickel. They are not energy-intensive as they were years ago when you had the smokestack. More energy went up that way than anything. I hope you are not basing your forecast on General Motors for the automobile industry, for example, which is cyclical, up and down, to get the consumers to buy.

That goes back to the report of the select committee in, I believe, 1978. One of the findings we made then was based on the growth rate for hydro being about 2.3 per cent. We came up with that suggestion. I think you ended up with 2.5 or something like that. We talked about the brownouts and blackouts that would occur. Just looking at that and bringing it into the case of the General Motors plant, I think you are on safe ground because we do not have all the energy-intensive industries we had before.

Take General Motors, for example, and the Saturn project that is being built near the Tennessee Valley, the electrical generating stations there are looking to produce the automobile in 32 hours on the assembly line, down from about 210 hours. If you look at the industry that is coming into Ontario, many of the Japanese plants are not going to be that labour-intensive or energy-intensive. They are going to be parts assembly plants more than anything. We have to look at that. You have to take that into consideration in your forecasting.

I hope somebody from the Ministry of Treasury and Economics is here and that you go back to the ministry with your forecasting. I hope it is comparable with what the Ministry of Energy has forecast for the year 2000; that there is some consistency.

Going back to that report in 1978 and what we found out, at that time people talked about the decline in the birth rate. If you think you are going to be gearing up your economy based on a declining birth rate, that is a false impression to leave on forecasting, because if you do not have the end product out there, we can put in the end use as you call it, but the end product is the consumer. If you do not have consumers buying the goods, you are not going to have productivity or jobs being created.

You probably will have more of an influx now of people coming back from the western provinces to Ontario, hoping that this is the dream province, that jobs are going to be here. No doubt there will be for those who are skilled in certain areas. I suggest you should take a look at the population trend to see that you are on target in your forecast.

4:40 p.m.

You or someone else mentioned the new policy of the United States and Canada. I suppose you are looking at free trade. This is an area we should be looking at when talking about economic trends and forecasting the potential impact if we go to free trade. If it is anything similar to what is happening in the northeastern part of the US, the industry is closing its doors and

heading south to some places in Mexico where there is cheaper labour. Maybe that is the area they would be looking at, down in Central America. They get cheaper labour and a more stable climate down there.

I do not know what area free trade will lead us to but I suggest to you that industries in the northern US are leaving the Great Lakes basin and heading south and one reason for that is the cost of energy. They do not want the high cost of energy to keep the plants running for seven months a year. All these things should be weighed in that. I hope in your forecast six months from now, when you bring in your final report, you may be looking at that area.

We talked about the trends and the new technology. Somebody mentioned the water heating systems in homes. Years ago, they used to do it by gravity feed; hot water would rise. The water tanks fed the larger rads and they provided uniform heat across many rooms in the house. Today, some have gone to electricity and gas-fired boilers. However, they do not have the larger tanks or the rads; they use a thin type of heat unit and you need to have a circulating pump to keep the heat in it. I can recall--

Mr. Chairman: Do you have a question, Mr. Haggerty?

Mr. Haggerty: It is better than the rubber man, I will tell you that much.

Mr. Chairman: I am not sure.

Mr. Haggerty: I did direct some questions about the forecasting. I hope you will take a look at this area. You should check with Treasury on its forecast of population growth. At that time, they were right on.

Ms. MacKay-Lassonde: Perhaps I was not clear when I made the presentation, but we do look at population growth, household formation, fertility rates and labour rates through the econometric model. That is why we said the model is very important; it is the model that gives us that type of information. With the true population and household formation, we can project the residential need in 2000. Then we can look at the end use through the end-use model.

Mr. Haggerty: I think we had about three or four witnesses appear before the committee at that time. They talked about econometric computerized assessment of the growth pattern for Ontario Hydro. Each one came up with a different number. I hope you will check this out very closely.

Mr. Rothman: The model that starts with population was developed after that and partly as a result of that. The focus on that entire long-term approach in a large-scale model developed after 1978. We also look at questions of industrial structure and whether we think there will be relatively more energy-intensive industries or relatively more industries that are less energy-intensive. Those are the types of things we try to look at with both models to ensure that we do take into consideration some of the issues you raised.

Mr. Haggerty: As Mr. Hill started out in his submission, I believe he may have been carried away and was leading us down the garden path, almost indicating that we are looking for a growth rate of approximately seven per cent again. He said we would have to get into this. Then he came back and ended up with 2.6 per cent. Was your final projection for load growth rate something like that?

Mr. Hill: When was that, Mr. Haggerty?

Mr. Haggerty: I thought I made a note of it, the 2.6 per cent load forecast.

Ms. MacKay-Lassonde: Our forecast is 2.6 per cent to the year 2000.

Mr. Haggerty: You come back to a normal area anyway; you were looking for another Darlington nuclear plant.

Mr. Chairman: Moving right along; Mr. Charlton, are you finished?

Mr. Charlton: Yes.

Mr. McGuigan: There are a couple of figures here that intrigue me. You show that in December 2004, you will need 6.4 gigawatts more electricity. You are telling us that when we finish Darlington, we should start building another one.

Mr. McConnell: We did not say that.

Mr. McGuigan: I know you did not say it.

Mr. Haggerty: He indicated it.

Mr. McGuigan: I am saying that is what you are saying; if you want to deny it, fine. There is a graph on page A2, figure ABA1. It says, "Annual energy per cent increase over the previous year." There are only two occasions when it dips below the line and goes negative. One is about 1932 and the other is almost 50 years later, about 1982.

Mr. Hill: Can I comment on the first point?

Mr. McGuigan: Yes.

Mr. Hill: I was giving an example of the supply and the possible demand based on the median load forecast. I went on to illustrate that in 2004, only if things stay as they are today--I think everyone in this room knows that they will not stay the same, but if they do--

Mr. McGuigan: I was coming to that.

Mr. Hill: --we will have a required supply greater than the current supply. That is all I was illustrating. I concluded that we either reduce the required supply or we increase the current supply.

Mr. McGuigan: I am using the past as a forecast of the future. We have always taken the route of increasing the supply rather than cutting down on the use. Other people have said we should not be doing that, but using the past as an example of the future and using that in the graph, only twice in the 50 years did the percentage increase in the use of electricity drop.

From the 1950s to 1977--this is where it first starts to drop--there must have been some efficiencies brought in, when we think of the progress we have made in manufacturing. We started insulating a long time ago. Fibreglass insulation was known for many years. Through that time, the increase was always on the positive side. It brings you to a conclusion that you had better get started on Darlington 2.

You have spoken of so many uncertainties. The reduction in the price of oil could bankrupt many Third World countries and many of our banks in Canada. It is not a scare thing; it is a reality. It could bankrupt these people because they have loaned billions of dollars to those countries, such as Mexico, which cannot possibly begin to pay back.

4:50 p.m.

In December 1985, we had the new food stance of the United States. The United States declared war on Canada and passed a new food law that in the view of practically everybody in Canada and in the agriculture business would bankrupt Canadian agriculture. That is 20 per cent of our economy. Many things could happen, yet we cannot sit here and say we are going to allow ourselves to be governed by "what if the sky falls in?" You are going by the premise that we go along somewhat the same as we have in the past.

Can you even this out in any way by investigating the possibility of shortening that lead time? You talk about the Japanese shortening their lead time to six years. We have picked up on the automobile business and what you have been talking about with General Motors. We are going to show the Japanese how to manufacture cars which is what General Motors is doing. It is saying: "We are going to meet you dollar for dollar and we are going to take out that $2,500 labour advantage you have in that car. We are going to produce just as good a car in North America, in Oshawa and in Tennessee." General Motors is putting $3.5 billion in a new plant down in Tennessee. General Motors is really saying, "We are going to produce just as good a car as do the Japanese even with our higher labour structure, and we are going to produce it for the same money. We do not have to sit in awe of the Japanese."

Why can we not do this to shorten our lead time in building these plants, so we are not as far out on a limb in forecasting these things?

Mr. McConnell: The question of lead time is a key thing that you have put your finger on. We will be addressing that in tomorrow's presentation. More specifically, we will be dividing it into two components. We shall be talking about how to improve the lead time associated with construction that you talked about. We shall also be talking about the lead time associated with getting approval, which you did not talk about, but that we consider equally important. We will address that question. It is a very important one.

When you were referring to the example we gave you, which was on page 6 of Mr. Hill's presentation 4C, you made the observation that it is difficult to say what kind of efficiency improvements have been made up to now. That is true. We have not attempted to quantify. Claudette MacKay-Lassonde made a presentation of what the actual load was between the early 1920s and now. One question that can reasonably be asked is what that load would have been if there had not been any efficiency improvements. We do not have any numbers to give you saying that instead of having a load of 20,000 megawatts, it might have been 60,000 megawatts if there had not been efficiency improvements. We know it is very large, but we cannot tell you the number.

On page 6 of Mr. Hill's presentation, we have attempted to give you a rough idea of what efficiency improvements are expected on the part of the customers and for our nonincentives. In that example, there is an efficiency improvement shown of 3.2 gigawatts taking place in the next two decades. That would take place without incentives. Then in that example we show another gigawatt of further efficiency improvements that are brought on by indirect

incentives and another 2.1 associated with direct control. There is an assumption in that example of achieving a 6,000-megawatt or a six-gigawatt improvement in the next two decades, due to efficiency and incentives. That is what is in that example.

Mr. McGuigan: Just to add to that and go back to this graph from the 1940s to the present time, one can think of improvements made by going from incandescent to fluorescent light. I remember seeing only one particular bulb, and it must have been a hangover from the turn of the century; it was one of those bulbs that had what looked like a toaster wire in it. It got about as red as the wire does in a toaster. There were great advances in efficiency during that period, perhaps not as much as there will be from this point, with the use of the computer and all the modern things that are available to us; nevertheless, progress was made during that time.

Mr. McConnell: Mr. Palmer went on a search last week to see if we could find one of those bulbs, but I am informed we were unsuccessful.

Mr. Campbell: I have one at home.

Mr. McConnell: Is it pre-1912?

Mr. Campbell: I have an Edison carbon-filament lightbulb, and it works.

Mr. McGuigan: I kick myself for not having kept the one I saw. It was in a storage room in my grandmother's house. It was one of those bulbs that just had a red glow to it when you lit it.

Mr. Chairman: We stand adjourned until tomorrow at 9:30 a.m.

The committee adjourned at 4:56 p.m.

N-37

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

THURSDAY, APRIL 3, 1986

Morning Sitting

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Leluk, N. G. (York West PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Forsyth, S.

Staff:
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

From Ontario Hydro:
Marriage, E. A., Manager, Bulk Electricity System--Resources Planning, System Planning Division
MacKay-Lassonde, C., Manager, Load Forecasts, Economics and Forecasts Division
Palmer, H. C., Director, Market Development Division
Fleming, R. A., Supervising Engineer, Demand Planning, Bulk Electricity System--Resources Planning, System Planning Division
McConnell, L. G., Vice-President, Power System Program
Rothman, M. P., Chief Economist, Economics and Forecasts Division
Campbell, T., Chairman

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Thursday, April 3, 1986

The committee met at 9:49 a.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: If I could ask Mr. Charlton to have a seat, we could come to order.

Members of the committee, I welcome you back right on time. We do have a very difficult schedule in order to meet the balance of the Ontario Hydro presentation, so I would ask for your indulgence on time today, because I intend to complete the schedule for today before we adjourn.

Mr. McConnell, we are at item 5, which is the demand management options. May we have Mr. Marriage? Carry on, please.

Mr. Marriage: First, I would like to introduce myself. My name is Arthur Marriage. I am the manager of the bulk electric system, resources planning department in the system planning division. I will be leading off this set of presentations on demand management.

We will be making five presentations on some of the aspects related to demand management. I will be making the first presentation, defining demand management and highlighting some of the factors which affect its implementation. This will be followed by three other presentations.

The second presentation will be the relationship between demand management and the load forecast. This will address the question of how much demand management is included in the load forecast and how this may change over time. Mrs. Claudette MacKay-Lassonde will be making this presentation.

The third presentation is on the past and current activities on demand management undertaken by Ontario Hydro. This will show that Ontario Hydro has been always active in the demand management field. We will also highlight some of the lessons we have learned from our past experience and how we will be using these lessons in our current initiatives. Mr. Hedley Palmer will be making that presentation.

The fourth presentation will be a review of the demand options and their potential as included in our phase 1 report on the demand supply options study. We will also be highlighting how our estimates compare with those in the northwest region of the United States.

In closing this set of presentations, I will be highlighting some of the demand issues on which we would like your views.

Due to the time of this hearing, we have limited our presentations on this subject to 80 minutes in total, and we will be highlighting only some of the key points. Again, I refer you to a couple of reports that Mr. Hill mentioned yesterday for further information on these options. One is 651SP, Meeting Future Energy Needs--An Initial Review of the Options, dated November

1985. The second one is 652SP, Demand-Supply Options Study--The Options, dated February 1986. I believe all of you have copies of those reports.

First, I want to define, from Ontario Hydro's perspective, what is demand management. It is each and every activity undertaken by Ontario Hydro intended to influence the amount and/or timing of electricity consumption. Ontario Hydro's overall demand management goal is to manage the demand in such a way as to provide the net benefit to our customers, both individually and collectively, and to Ontario. The goal and objectives of the demand management are driven by the corporate goal, the corporate mission and corporate values. These were presented last fall by Milan Nastich. They include but are not restricted to customer satisfaction, the Ontario prosperity, total cost, customer equity and resource conservation.

Demand management is not new to Ontario Hydro. It has always been a part of Ontario Hydro's resource planning, but what is new is our increased emphasis on it for future planning. This was noted earlier yesterday in the presentations by Mr. Campbell in his opening remarks, and Mr. Franklin on the proposed demand management strategy. It will be further emphasized in the following discussions by Mr. Palmer and Mr. Fleming.

I want to outline the options available to both the customer and Ontario Hydro for managing customer demand and then I will discuss the ways of bringing these options about. There are seven components and most of these include conservation.

The first one, new electricity installations, use currently available technology, such as an electric heat pump, to substitute for other forms of energy. The second one is new electricity applications such as the thermal-mechanical wood pulping and plasma arc steelmaking. The third one is the maintenance of existing loads, such as electric water heaters, based on the awareness of costs and the benefits to both the customer and to the province.

The fourth one is application improvements to reduce both the costs and increase energy efficiency in current applications such as efficient lighting, efficient motors and more efficient appliances. The fifth one is customer advice in terms of efficient utilization of electricity to reduce waste and energy costs. One simple example is turning off the lights when not in use.

The sixth one is load shifting where the electricity use is shifted from the peak period to the off-peak period to reduce costs and the need for new capacity. Examples of this are the remote control water heaters with large storage and time-of-use rates. The seventh is as a last resort, load curtailment to reduce the total demand in the event of an actual of expected electricity shortage.

Before going further, I will address briefly the subject of conservation. This was discussed in our presentations during the hearings last fall. We strongly feel that promoting both new electricity uses and increased efficiency of electricity use are consistent with assisting our customers to get the best value out of their electricity system. Customer satisfaction is one of our primary goals on demand management.

Encouraging customers to adopt electrical options, possibly involving new technology, can increase productivity, improve their standards of living, and displace energy produced from nonrenewable gas and oil. This also conserves these resources for other vital uses such as transportation and feed

stock for the petrochemical area. At the same time, encouraging other customers to improve their efficiency of electrical use will help them get the desired service they want with less electrical energy and at a lower cost.

Both of these activities are resource conservation, or the wise use of all resources. This includes increasing efficiency, reducing waste and using renewable hydraulic and abundant resources, such as uranium and coal, rather than long-term scarce resources such as oil and natural gas.

I want to move on to the ways of bringing about demand management. I identified the seven components of demand management and those are listed in blue down the left-hand side of this matrix. There are six ways of achieving demand management options either voluntarily by the customer, or by Ontario Hydro. These are research, education, promotion, incentives, public appeals and mandatory actions.

It is a point to remember here that most of the cells within this matrix include Ontario Hydro's commitment to both the conservation or efficiency improvement and the prosperity of the province. A couple of examples are the research into application improvements and incentives for efficient utilization, such as time-of-use rates.

As I indicated earlier, the following presentations will be dealing with or highlighting how these methods have been used in the past and how they will be used in the future in trying to implement these options.

10 a.m.

In our report and later, we have identified several promising demand management options. Many of these applications involve increased efficient use of electricity or the replacement of oil and gas with electricity from the more plentiful renewable forms of primary energy, as I have indicated, coal, uranium and falling water.

Although Ontario Hydro will be pursuing demand options agressively, the potential which can be realized and the impact on our future resource plans depends on several factors. These include; the rate of technology developments, the relative energy prices and electricity's competitive position, customer behaviour and the customer's knowledge about the options, the system, financial, institutional or regulatory contraints, and a broad customer acceptance of strategic options induced by Ontario Hydro for different customer groups.

I will briefly outline these factors which impact both on the extent and how much of the options are adopted and the rate at which these options are adopted. The first one on technology development is fairly obvious. As you would expect, it will only be possible to adopt some of the new technologies once they have been developed, tested and proven efficient for commercial use.

The increase or decrease in both existing and new electricity applications will be affected by the price of electricity compared to the cost of doing the same job with other energy forms, such as oil and gas. There are many applications displacing fossil fuels, such as the heat pump, which will conserve total energy resources but increase electricity use. This could result in higher electricity bills but lower overall heating costs.

In my own case, I installed an electric heat pump on my gas furnace in 1978 and after five years, the savings in my gas bills paid for the

installation of the equipment plus the extra cost of electricity, and I have been reaping savings ever since.

Mr. Haggerty: You are working for Ontario Hydro.

Mr. Marriage: That too.

Another important point is customer behaviour and his knowledge. Demand management potential will be affected by both the customer's behaviour and his knowledge about the options. The customers, such as yourselves, may not adopt some of these demand management options if they result in adverse impacts on their lifestyle or their businesses. One of the points raised the other day by Mr. McGuigan was that he needs to keep his fruit chilled. It does not matter what you offer him in terms of trying to shift load or anything else, that is an important thing in his business and it may or may not affect adopting these. The other one is the customer's appropriate knowledge about the benefits from these options.

As I indicated earlier, the extent to which the demand options can be realized and the potential contributions we are currently assuming, are also affected by the electrical system, financial, institutional and regulatory constraints. Some of the system constraints were discussed earlier yesterday in presentation 4 looking at the bulk electricity system perspective. One of those constraints is the amount of load shifting possible based on the load shape. Some of the financial constraints are the access to available capital at competitive rates, and the quick payback of less than three years looked for by many people. These constraints can be partially or totally removed by the utility or government through financial incentives.

The institutional constraints deal with the arrangements between groups who benefit from the option and those who have to make the capital investments on the option. One of the examples is the tenant-landlord relationship in multi-dwelling buildings. In most of these cases, if the tenant reduces his electricity consumption, he sees very little direct benefit. Normally, the landlord pays the bill and that is just included in his rental. The tenant could benefit from the energy savings through individual metering, but then the building owner would likely have to foot the cost of changing all the metering from bulk to individual metering. That is only one example. There are several others that fall in that category.

Another issue affecting both the amount of demand management and the rate at which it can be implemented is the question of fairness or customer equity. Ontario Hydro is currently reviewing incentives to encourage demand management, and one of the issues raised by some of our customers and this committee's consultants is the question of whether individual customer's needs should be met with undue expense to all other customers. Mr. Franklin raised this issue in his presentation yesterday, as did Mr. Cavanagh and Mr. Jones on April 1.

Ontario Hydro can reduce demand by paying the full cost of a potential supply option that is avoided. This is commonly referred to as the long-term marginal cost or societal test. I would like to try to illustrate this without getting too technical. Let us first consider an increase in load demand. We could build a supply option to meet this new demand. The cost of that option would then be spread over the increased total system demand and electricity rates would go up.

On the other hand, if the total demand is reduced through demand

management by the same amount as the increase coming about by some other application, there is no net change in the demand and no additional supply facilities would be required through the demand management option. However, if we take the costs of the demand management option as being the same as the supply option, that cost is spread over a lower demand base, as in the previous case, which had supplied the increased demand.

Because it is over the load base, the rates are going to be higher than in the first case. In other words, the customers receiving the incentives reduce their energy use. Although the rates go up, their energy bill will go down through the reduction in consumption. All the other customers who are unable to adopt that option will face both higher rates and higher electricity bills and will be effectively subsidizing those benefiting from these options.

That leads us to another form of incentive, and this is where the rates would not increase. We would limit our incentives so rates would not increase any higher than they would for the alternative supply option. This is known as the nonparticipant or no-loser test. We will be hearing more about this in the later presentations.

10:10 a.m.

In wrapping up, I have indicated that demand management will impact on Hydro's future resource plans. I hope the presentations that follow will provide you with more insight into how demand management has been and is projected to influence our supply requirements. The presentations will address how demand management contributions are included in the load forecast, look at our past and current demand management activities, look at some pilot demonstrations and programs now being introduced to expand our knowledge on both the potential of the demand options and the customer acceptance of these options and look at the future potential and the factors affecting the applications.

I now call upon Claudette MacKay-Lassonde to address the first of these topics.

Mrs. MacKay-Lassonde: This morning I will explain to you the relationship between Ontario Hydro's demand management activities and the load forecasting process.

More specifically, I will talk about the effects on customer behaviour of past demand management programs of research, education and promotion; I will define the terms "natural" and "incentive-driven conservation" and their use in quantifying the potential effects of future demand management programs; I will give you a few examples of the natural conservation built into the load forecast and, at the conclusion of my talk, I will outline what we are doing to improve our capability to assist in the demand management planning process.

My first topic is customer reactions to research, education and promotion. Ontario Hydro has been involved in demand management programs of research, education and promotion for more than 50 years, as Hedley Palmer will tell you in the next presentation. These programs have given consumers new equipment and information about how to use electricity wisely. In doing so, they have affected the way our customers use electricity.

In load forecasting we look at past patterns and trends in customer behaviour. These historical trends picked up by our models help us to project how consumers will use electricity in the future. Because demand management

programs influenced past customer behaviour, their effect on electricity demand is included in our forecast.

I want to talk about natural conservation versus incentive-driven conservation. The future demand management programs could offer incentives to promote electricity conservation. To assess the potential contribution of those programs, we in the load forecast department must first understand how much consumer-initiated conservation is already included in our forecast. That is what we call natural conservation.

The important aspect of natural conservation is that the customers do it on their own. They use their own money to get more energy-efficient equipment or they change the way they use energy. For example, home owners can turn down their thermostats or add insulation to their houses. Businesses can adopt new technologies, such as replacing old electric motors with more efficient modern ones. Managers of office complexes can replace their lights with new models that use less energy. Natural conservation, as I mentioned before, is included in our forecast.

Incentive-driven conservation, on the other hand, refers to increases in energy efficiency that consumers make only if Ontario Hydro helps them financially. That help could be in the form of rebates, loans, grants, rate structures or anything else that would make it more attractive for them to adopt conservation measures. Of course, no estimate of incentive-driven conservation is built into our load forecast since that is under consideration in this study.

To evaluate new ways of increasing efficiency, our demand management planners need to know how big an increase in efficiency can be achieved by a specific incentive-driven conservation program. To do this, they need to know first how much efficiency improvement is already included in our load forecast. That means we have to calculate the amount of natural conservation. We do it by taking the difference between two separate forecasts. One reflects our best set of conservation assumptions, and this one is our most likely forecast. The other shows what would happen if consumers did not increase efficiency at all. Essentially, we freeze efficiency to do that forecast.

I want to emphasize how important these definitions are when we start to look into future demand management programs. We want to avoid counting any conservation measure twice, once in the load forecast and then again in the list of possible future demand management activities. Once we know how much efficiency improvement is likely to occur without incentives, we can determine how much more can be achieved with incentives.

I would like to give you some examples of natural conservation that are included in our load forecast.

In the residential sector we assume by the year 2000 the efficiency of stoves will improve by 15 per cent over the 1980 level. Similarly, residential lighting is assumed to improve by 10 per cent, refrigerators and freezers each by 10 per cent and room air-conditioners by 12 per cent. However, total electricity use per household will still grow as people are able to afford more and more appliances, most of them powered by electricity.

In the industrial sector, we expect there will be additional improvements in the efficiency of energy use. For example, in our end-use model, we assume that the amount of electricity needed to produce a ton of cement will fall by 15 per cent from its 1980 level by the year 2000.

Similarly, we assume it will take nine per cent less electricity to make a ton of newsprint and three per cent less electricity to make steel in an electric arc furnace.

I want to turn to what we are doing to improve our load-forecasting capabilities. We have a number of initiatives under way to ensure that we continue to provide good load forecasts. We are developing ways to separate the effects of the two factors contributing to natural conservation.

The first factor relates to customers improving their efficiency, using existing technology to save time and money. The second factor relates to new technologies, which are generally more efficient than old ones. In our current measurement of natural conservation, we lump these two factors together. In the future, when we start defining and evaluating incentive-driven programs, we will need to assess how incentives will affect the penetration rate of new technologies.

10:20 a.m.

We are also continuing to develop our computerized load forecasting model capabilities. As I mentioned yesterday, we are in touch with forecasters in the United States who have successfully used new models developed by the Electric Power Research Institute. These are the models I mentioned which are state of the art in terms of end use for both the residential and commercial sectors. We have just purchased them and will start adapting them for Ontario conditions. In addition to getting these new end-use models, we are working on improving our existing end-use model.

We have also increased our contacts with other forecasters. As I mentioned yesterday, we have worked with EPRI and other utilities to develop and test a package of short-term forecasting models. We have strengthened the exchange of information between the Ministry of Energy and ourselves. We are members of the load forecast working group of the North American Electric Reliability Council for which, with Hydro-Québec, we are developing bandwidth forecasts for Canada.

We recognize that our analytical capability is needed by Ontario Hydro's system planners and we work towards providing them with continually improving services.

This concludes my presentation. I have talked to you about the effect of fast demand management programs on customer behaviour. I have defined natural conservation and incentive-driven conservation and how we try to quantify demand management programs. Finally, I have given you some examples of natural conservation included in our load forecast and what we are doing to improve our capabilities.

Mr. Palmer: I understand it is de rigueur for each new speaker to introduce himself and state what he does. I am the director of the market services and development division. I want to take a minute to tell you what that division does because it is significant in terms of the things the select committee is thinking about in this session.

The division is responsible for all rate development, including the rates Ontario Hydro offers for wholesale and the rates offered by municipal utilities and our rural retail system. Ontario Hydro has a regulatory mandate for the municipal utilities, and that mandate is administered out of my division. The business interface with direct customers, contractual

arrangements and the billing of municipal and direct customers are handled out of my division. Many of those customers pay us millions of dollars every month and they can get instant feedback if they complain about the bills from the people who do business with them day in and day out.

The division is responsible for all the studies that are done for demand management with customers, strategic conservation and load management. The division administers our programs for small power producers, cogenerators and the rates Ontario Hydro pays for electricity from them. All the training for people who do business with customers is administered out of this division. The business plan, customer research and market research ultimately used to prepare programs that go out to the customers are determined in the division.

I may have forgotten some things, but I think that is enough to show the relevance of the division.

The year was 1912 and a new operation had just started in makeshift quarters on Strachan Avenue in Toronto. In the long years ahead, it would come to be known as the Ontario Hydro Research Laboratories. The utility itself was a scant six years old and had delivered power for only three years, but already it had come to appreciate that low cost and good service were not the only things the new utility had to do. Customer satisfaction rested on more than that. That was because customers did not use electricity directly. Customers used things that used electricity. The things that used electricity in 1912 were light bulbs. They were inefficient and unreliable. The new lab undertook to do something about that. They did, and for 30 years thereafter, Hydro light bulbs were sold in Ontario that were a cut above contemporary offerings both in terms of lighting efficiency and reliability. There may be oldtimers around in the group who can recall that.

The photometric section of the lab went on to develop lighting standards, to search for more efficient lighting and generally to be a major force in this field in Ontario and elsewhere.

I make something of this point simply to show that Ontario Hydro's interest in demand management started pretty early in the years it has been in this business. It has been 80 years. It honed its skills, had some successes and some failures and learned some lessons, not the least of which is it must adjust to the extent it can to the mores of contemporary society as they change over time, which is a very important thing.

One important spin-off is that the electrical utility in Ontario is one of the most capacity-efficient systems in the world. The technical name of that efficiency is annual load factor. The figure of merit for load factor is like marks given on an examination paper. For most utilities the marks are 50 to 60 out of 100, or 50 to 60 per cent.

Quebec Hydro is at 65 per cent. That is a pretty fine performing number. The Japanese, with their much vaunted efficiency, are at 55 per cent. The American systems are generally in the low 50s. The big investor-owned utility in California, Pacific Gas and Electric, is at 51 per cent, and of the two big public power systems in the United States, Bonneville is at 56 per cent and Tennessee Valley Authority is at 55 per cent. For Ontario Hydro, the figure is 68 per cent. All these are 1984 figures.

For the people of Ontario that is both a plus and a minus. It is a plus in that they have enjoyed the benefits of high load factor, which means lower costs for a long time. It is a minus in that further improvement by peak

shaving and load shifting are harder to come by than they are in most other utilities.

Returning to the lab for another minute or two, the chairman, Mr. Campbell, already noted its work in the 1930s on improving the efficiency of electric water heaters. Twenty years later it was at it again because people were beginning to express dissatisfaction with electric water heating then on the market. The result was the development of a new water heater that reached new standards for energy-saving water storage. It was franchised across Canada as the Cascade 40 water heater. Some of you may remember it. Some years later it became a standard in Canada, administered under the Canadian Standards Association. Since that time, which was about 1970, it has prevented substandard water heaters from coming into Canada and Ontario from elsewhere, most of them manufacturers who make water heaters in the United States.

<u>10:30 a.m.</u>

Yesterday, Mr. Charlton raised the point about water heater wraps and whether it was a good program. I want to say that all that glitters is not gold.

Some months ago, the Bonneville Power Authority invited us to go to its utility and sit in with it while it made a thorough review of its energy conservation programs. The man who went from my division had some instructions from me to look very carefully at the water heater wrap program, as well as other programs. He came back. After a careful look at it, we decided there was not very much in it for Ontario.

The reason was that the water heater the lab had developed in the 1960s, which had a very low loss, could not be materially improved with the present technology because a very large proportion of the remaining loss in the heater was through the feet of the water heater. Recall that the water heater, filled with water, is a very heavy device. It weighs about 700 pounds. That means it had to have pretty sturdy feet. There is a heat loss through the metal feet of the water heater. It is very hard to do anything about it without a fundamental redesign of the water heater. Putting on a water heater wrap to save an amount of energy roughly half the size of the smallest light bulb you can buy on the market is not really a very economic operation.

All is not lost on the subject of water heaters. There is a brand new concept of water heaters just coming on the market that looks very promising in terms of heat loss. That is an all-plastic water heater. That means it can be much better insulated in respect to feet and other things. There is some real promise for some benefit in water heaters still to come.

Let me move on. Fluorescent lighting did not work very well on Hydro's 25-cycle system. The transfer to 60 cycles in the 1950s changed all that and Hydro formed a new lighting department to assist customers, consulting engineers and others in the conversion of the old incandescent lighting to fluorescent. Fluorescent lights reduced electricity use very significantly. Mr. Campbell talked about that yesterday. It provides better and more uniform illumination.

For instance, many school boards throughout Ontario at that time, using Hydro designs, converted lighting in their schools to fluorescent lighting. That not only reduced the cost and the energy use the school board had to pay for, but it also improved the lighting materially for the children in the classrooms. I want to note that this initiative was very much a part of

Ontario Hydro's efforts during the now much maligned live better electrically program of the 1960s.

Last weekend I walked through some new homes being constructed in my area. I was impressed with the excellent insulation in those homes, how well it was installed and the splendid application of vapour barriers. I noted the insulation had a marking strip on it that told anyone who wanted to look how much insulation was there. Every time I see that it makes my day because I was one of a Hydro team that helped develop and strongly influenced those things in the 1960s. Insulation and vapour barriers were dirty words to consulting engineers, builders, developers and others in those times. Many thought Hydro had fallen out of its tree in talking about insulation.

There were problems with more insulation. More insulation, tighter windows and vapour barriers limit moisture removal created in the homes through normal routine living such as cooking, washing, and so on. That moisture has to go somewhere, but it must not make a perpetual rain forest in the attic. Good attic ventilation solves that problem, but that was not particularly well appreciated in the 1960s, certainly not as well as it is today.

Hydro's research and development in that area resulted in a good many thousand, well-insulated, energy-efficient, electrically heated premises in Ontario that exist today. That work set the stage for many of the standards and practice of insulation that is generally been followed, almost uniformly, everywhere in Ontario and Canada now. Had other fuel suppliers followed that lead in the 1960s we would have had a very much better stock of energy-saving premises in Ontario in the 1980s.

By contrast, the utilities of the American Pacific northwest promoted several hundred thousand electrically heated houses in the same era with no particular emphasis on insulation at all. In very recent times, they have been shelling out considerable sums of money, in fact millions, to remedy that oversight. I made a telephone call to my Bonneville friends a day or so ago and they reported to me that they hope to have a weatherizaton program for 300,000 of those homes at a cost, they believe, of US$480 million. When it is cold and stormy here in Ontario in the middle of winter, I am pretty smug about that program.

In the 1970s, Ontario Hydro started an in-house conservation program called TRIM, The Responsibility is Mine. It was vigorously promoted within the organization, and energy savings were very substantial. About $10 million were saved at an expenditure of about $1.8 million. A valuable lesson was learned from this, however. Initially, savings come easily and they do not cost very much. Subsequently, it gets harder and it costs a lot more. Then you reach the point when you do not get much more saving and you put in an awful lot more money. To put the matter more ponderously, the law of diminishing returns takes effect with lightning speed in these matters.

Let me turn to another lesson learned. You must keep remembering that the programs you offer had better provide value to customers in their terms, not yours. There is a legend about a creative man who invented a better mousetrap. It was quite a bit more expensive but it drew mice like a magnet, and besides, it was ornamental. In spite of the heavy promotion, it did not sell. The plain fact of the matter was that many people were squeamish about the whole business of catching mice and they preferred to throw out the trap with the caught mouse. Have any of you ever done that? Their sense of value was such they could not bear to throw out the expensive trap. Therefore, they

continued to use the old, cheap, less effective, but in their eyes, disposable trap.

Not so long ago, we built a better mousetrap. We called it a plenum heater program. It was to support the federal off-oil initiative. When customers collected all the available grants and incentives, they could get a dual energy, electric-oil system in place for about 400 bucks. Our engineers pronounced it safe and effective. Our economists said the value in it was substantial. It was cheaper to install and cheaper to run than other systems. It could not miss in the marketplace, but it did, and how. We were astonished to see customers blithely pay 2,000 bucks for an all-electric system instead. Their sense of value was clearly different from ours. We went to some pains to find out, but that is another story. The point is that programs and products prosper that represent value to customers prosper and those that do not, do not.

While I have an opportunity, I want to mention interruptible rates for large industrial customers. The rates were first introduced in 1961. Since that time, contracts have been negotiated for about 1,000 megawatts. No other utility I am aware of has a figure approaching that. This demand management option is clearly recognized by these customers as having a value to them. It has a value also to all customers on the system because no generation is planned for these loads. They ride on the reserve. In time of temporary short supply of transmission or generation they can be interrupted, as they have been several times this past winter. In any full interruption of all contracts, Hydro can count on a load reduction of about 500 megawatts.

You may wonder why we have contracts for 1,000 and get only 500. That is easy. Not all customers have all the load on at the time we want to interrupt. Therefore, we can get from them only the load they actually have on the system when we need relief.

10:40 a.m.

From time to time, we have examined the potential for even more interruptible load. The incredible communication technology currently coming on the market may make that possible. It may make it possible to extend that to a wider spectrum of customers, but that remains to be tested. A lesson learned from this program is that the utility cannot go in and out of the market on matters such as this. It must set its course and stay with it for the long haul. That is because customers who take interruptible load build their businesses around the fact that interruptible will be available through the long haul. They price their products and arrange their union contracts and whatever, and it is neither right nor proper that the utilities should be in it one day and out of it the next. It means that the utility must be careful and deliberate about the programs it introduces that impact in one way or another on customers.

In the early 1980s, we began two pieces of work, one completed last year and one to go for some time yet; in order, the load management field trials and the time-of-use rate experiments. The results of these pieces of work will be valuable for designing future programs for demand management. Currently, we are deeply involved with a number of customers with potential for cogeneration. Later this year, we hope to have a trial installation under way with a major customer in northwestern Ontario. We are also looking at small generation, potentially suitable for a school, college or hospital.

I wrote these notes last week and I read something somewhat

disconcerting on the weekend that I would like to get my hands on before we proceed with small cogeneration.

This little folder I have is the Public Power Weekly put out by the American Public Power Association. This is the March 24 issue. It says that the Department of Energy in the United States has just received a long report from a consulting engineering firm it engaged to look into small cogeneration potential and economics. For the purposes of this, they were units of less than 1,000 kilowatts.

The report noted that the most extensive research in this field had been done by the Gas Research Institute in the United States, which is the organization comparable to the one that has been mentioned here for electricity, the Electric Power Research Institute. It is a comparable kind of organization and in the past two or three years it has spent more than US$200 million on research on small cogeneration units. The United States Department of Energy is indicating that the cost of small cogeneration, that is, the power production cost, is still fairly high and it can compete only with the most expensive kinds of generation. It mentions natural gas and oil systems in particular.

I think we need to look again at whether we should proceed with that. We will get our hands on the report and study it more thoroughly.

It is beguilingly easy to spend money on demand management programs. It is much more difficult to ensure that value for money is received. A speaker from the Electric Power Research Institute at a demand management workshop I attended not long ago made this comment, "The generally mediocre cost effectiveness of demand management programs in US utilities can be laid to insufficient and ineffective market and customer research."

That is not a surprising observation. Utilities tend to be technologically driven rather than market-driven, so for the most part they do not have a keen appreciation of customers' needs and values. It is a risky area and we are proceeding in a careful and deliberate way to do our homework, our field testing and our customer research, and are not just leaping in with a fistful of dollars without well-defined, well thought out programs. That is not our way and it has not been our way for a long time.

Yesterday some reference was made to Dr. Lovins's comment at transmission line hearings about the 25- to 60-cycle program, suggesting that we had previously attempted a major program and that there was no reason we could not do it again, although he had the time frame long. I thought that was not such a bad comment on the face of it, but you want to think about what that involved. It involved going into two million premises in Ontario--homes, businesses, industries--finding out what they had, engineering something to replace it and going in and replacing it. It took 12 long years and an enormous sum of money. It was in fact the largest capital investment Ontario Hydro had ever made for anything up to that time.

If you think about it in today's kinds of money and today's society, it is very doubtful that the program could be accomplished at all. If you think Darlington represents a big buck, it is likely to be nickels and dimes compared to that program, were it done today, taking into account the greater number of people and the greater sophistication of the equipment in homes, in industry and so on.

To be positive about demand-side programs, they appear to be excellent to follow load changes and they may be better in many instances on large power plant construction.

I have been talking about demand management programs, and they were defined for you earlier by Arthur Marriage. I do not want to change his definition, but I want to tell you how I see it. As I see it, demand management is the business of working with customers to balance in the most efficient way--that is important--their needs for electricity against the utility's ability to supply that need. This means the utility should have both conserving and selective-selling programs. I personally do not believe it is a sin to sell more electricity if it makes industry more productive, commerce more efficient, the quality of people's lives better and Ontario more prosperous.

Let me try to illustrate the point. Hydro, through its research, developed a means of drying lumber that uses only about 10 per cent of the energy of conventional methods, but it uses more electricity. That research would never have gone anywhere if Hydro had not been out demonstrating its advantages to the customers who might use it. Now the Ontario furniture industry is making use of it and is reducing its cost and making it more competitive.

It is my own observation, indeed, that nearly all improvements in business and industry are made through the efforts of salesmen with a better product to promote. The infrastructure of our society requires this kind of initiative. I can put the matter very crassly indeed: If you are going to be a successful tomcat, you had better make calls. I think that is the nub of the matter.

In the way of final words, I want to comment about the municipal utilities. They deliver about 70 per cent of the power that Ontario Hydro generates to customers. They have discharged their responsibility in this regard for the same 80 years that Ontario Hydro has. They have a strong feeling of proprietorship in Ontario Hydro. They were there at the start; indeed, they were there before the start, promoting the concept and committing themselves to the principles later enshrined in the Power Corporation Act.

10:50 a.m.

They are still fiercely committed to the principle of power at cost. For them that means more than mere words. It means a singular focus on cost to them for electricity production caused by them. That real dollars-and-cents value must be there for them and their customers. It means that Ontario Hydro programs of any kind must meet their stern criteria of value. Their vision of the mission of Hydro in Ontario has been remarkably consistent over eight decades. It is an anchor for this enterprise in a society where views keep changing, sometimes with dismaying swiftness, to realize that those distibutors continue to have a very clear concept of what their purpose is, and they stick by it year after year.

For the last few minutes I have attempted to illustrate some key points and issues relevant to demand initiatives. It is not a new thing for Ontario Hydro to be in this field, and I have gone through a few examples. Demand-side programs must be cost-effective so that industry and commerce in Ontario will continue to be competitive. Quality of life and customer needs and values in their terms must be respected if programs are to be successful. As well, municipal utilities are key players in Ontario Hydro's programs.

I have made no attempt to give you a rather long list of demand management programs that Hydro has in development or in place. Instead, I have used a few from Hydro's past experience to illustrate the key points I wanted to make. We have provided a long list to your consultants, however, so that you will not be left out. The list covers these subjects. There are nearly 30 programs. The brief summary of them takes about 20 pages, so you have that to look at at your leisure. Thank you very much.

Mr. Fleming: I am afraid I may not be quite as entertaining as Mr. Palmer. I hope I do not put you to sleep.

My name is Rick Fleming. I am a supervising planner in systems planning. My interest is in the area of integration of demand planning into the supply planning function, or into general systems planning. Along that line, one of the things I have been involved in during the last year or so has been as a technical adviser for a Canadian Electrical Association contract, dealing with ways of implementing conservation as a utility resource. You will be hearing later in your hearings from Todd Davis from the Synergic Resources Corp., and he may be covering that topic.

You have already heard about Ontario Hydro's efforts at improving the efficiency and effectiveness of electricity use in the province. You have also been provided information about a research demonstration and pilot programs. I will be concentrating in this presentation on the potential for future improvements.

I would like to review with you some of the demand options that can be used to shift load and improve the efficiency of existing electricity use. Recognizing that our estimates are very approximate, I will compare our expectations with those of the Northwest Power Planning Council to put our estimates into perspective.

Finally, I would like to point out some of the questions that need to be answered if future demand planning is going to be successful. These include: How will the level of incentives affect the potential for conservation? How accurate are our conservation estimates? How long does it take to achieve full potential? How will new technologies impact on the demand for electricity? Will conservation included in the load forecast actually occur without incentives, or will Ontario Hydro and others have to take a very active role in this?

I will start with load shifting. As you will recall from the earlier presentations, load shifting refers to moving the demand from one period to another in an attempt to reduce the operating costs. Although reducing the peak demand may also delay the need for new supply facilities, the desirability of such action is determined by system characteristics. Therefore, the potential for load shifting will be limited to a great extent by the existing electricity supply system.

This slide illustrates a typical January weekday load shape. It is roughly what we anticipate in the year 2000. As you can see from the top line, the demand tends to peak twice during the day, once in the morning and then again in the early evening. Since local utilities are charged according to the size of their peak demand, short-duration peaks like these provide financial incentives to shift customer loads. Many of the utilities have, in fact, a controlled water heater program, which addresses just that problem. It is usually a short-duration, two- or three-hour peaking operation where they will clip it. Oakville, where I live, happens to have one of the utilities that

does that, and it has been doing it for some time. The top line basically reflects all these activities that the municipal utilities are already taking into consideration, and this is what the bulk system sees.

The benefit from further load shifting is less than one might expect from the top line. Ontario Hydro currently uses peaking hydraulic generation to meet much of this daily fluctuation. This leaves us with the lower line, which you can see is quite flat for about 16 hours of the day. The options we have looked at were evaluated on the basis of their ability to shift loads out of this 16-hour period.

The next slide shows the options we considered in phase 1. They have been divided into direct control options, which can be activated by the utility through electronic signals, and indirect control options, which are implemented through rate incentives.

As you can see from this figure, the potential for customers to shift their load appears to be between 1,600 and 3,100 megawatts. This is considerably more than the 1,000 to 1,500 megawatts the system can absorb before the lower line on the previous graph becomes flat. In fact, the economic level may be somewhat less, since the benefit decreases as you approach the limit.

Since the costs of the options are all quite similar, ranging between $30 and $40 a megawatt-hour, no one option stands out. The conclusion is that load shifting is desirable, but the potential is greater than the system can use. Therefore, care must be taken to ensure that the options we select have the least impact on the customer and at the same time do not overshoot the amount the system can benefit from them.

Before I get into the conservation estimates, I would like to point out a couple of factors that impact on our estimates. The potential for efficiency improvement will depend on how much has already been done. The accuracy of the estimates is very sensitive to the information that is available. The data necessary to identify specific options that could be taken and the degree to which they have already occurred need improvement.

The end-use models we talked about earlier, which are used in the load forecasting, deal with how much energy is used to satisfy specific needs such as heating houses and whether the fuel used is oil, gas or electricity. They do not tell you how many houses have insulation in their attics or anywhere else, how much is there, whether there is room for more and what incentives would be necessary if we were to try to convince the home owner to do more.

The second point I want to make is that, from a planning perspective, it is desirable to isolate those actions the customer is unlikely to take without assistance. If a utility pays for conservation that customers would likely pursue without incentives, then the incentives are merely advancing conservation that is already in the load forecast and not eliminating the need for new generation.

11 a.m.

We have attempted to take this into account by assuming that actions that have a payback to the customer of less than three years are captured in the load forecast. The options I will be presenting have paybacks greater than three years, and we feel that they will require incentives on the part of Ontario Hydro to bring about.

This is basically a proxy for one of the barriers that we identify out there. There are a number of other barriers that were identified earlier. The whole idea of strategic conservation is to try to identify clearly where those barriers lie and what the utility can do to overcome those barriers.

Getting on to the potentials we have identified, the residential customers tend to be similar in how they use electricity. Therefore, it is possible to identify a number of actions that have general application in the residential sector.

This slide shows the options we have identified as strategic in the demand and supply options study. They include retrofit insulation in electrically heated homes, R-2000 standards in new home construction, more energy-efficient appliances and replacing central forced-air electric furnaces with ground source heat pumps. Improvements in lighting have not been forgotten, but they are considered to be more appropriate to the commercial and industrial sectors, where the load factors are much higher.

Capital costs for these conservation options range between $800 and $4,200 per kilowatt. The appliance costs may seem high. That is because the savings to the system reduce, since not all appliances will be operating at the same time. We traditionally refer to this as diversity, and it is an important factor when you are talking about how much it is going to cost you to make a modification on the system.

We have identified approximately 500 average megawatts of potential by the year 2000, which could represent up to 1,400 megawatts of demand reduction at the time of system peaks. This is the residential sector again. When their impact on the system is considered, the energy costs fall in the range of $25 to $45 a megawatt hour, costs that are quite comparable to those of the supply option.

Estimating efficiency improvements in the commercial and industrial sectors is considerably more difficult because of the wide variety of building types and industrial processes. We know that efficiency improvements are possible through more efficient lighting, more efficient motors, improvements in heating, ventilating and air conditioning equipment, the use of energy management systems and process improvements. However, better information is required before generating detailed estimates of the potential.

Our phase 1 estimates were based on Ontario Hydro marketing experience with the customer and assistance provided by Engineering Interface Ltd., an Ontario energy management consultant in the commercial field. Tom Tamblyn, I believe, will talk to you later on in the hearings.

To improve our estimates, we have contracted with Engineering Interface to provide a more detailed review of the commercial sector. We also have contracts let in the industrial sector to investigate the potential for efficiency improvements in the food and beverage industries, the transportation equipment industry, the chemical industries, the primary metal industries, the petroleum and coal industries and the mining and pulp and paper industries. These industries combined represent more than 75 per cent of the industrial demand for electricity.

To move on to our total estimates, this slide shows what we think the total potential is for reducing the need for new supply facilities by the year 2000 through efficiency improvements. Although we show these as single-point estimates, there is a large uncertainty in these numbers.

Approximately 3,000 megawatts of efficiency improvements that do not require incentives are considered in the load forecast. We expect that approximately 1,000 megawatts of conservation may be possible through incentives that are fair to all customers, and that gets to the no-loser test.

An additional 3,000 megawatts may be possible if the full cost of the conservation is paid by the utility, closer to the marginal or societal cost. Standard costs for the improvements requiring incentives are expected to fall in the range of $25 to $45 a megawatt-hour.

In total, up to 7,000 megawatts may be possible, depending on the tradeoffs the province is willing to make. Seven thousand megawatts represent more than one third of the present demand for electricity in the province and are enough capacity to satisfy the peak demands of a city almost twice the size of Toronto.

The real question is, how reasonable are the estimates? Recognizing the need for better information, we looked to other jurisdictions as a cross-check. We recognize that our data are very limited.

The Northwest Power Planning Council prepared its first 20-year resource plan in 1983. In their plan they take a very aggressive position concerning conservation, giving it priority over comparably priced supply options. They also accept the fact that incentives covering the full cost of efficiency improvements may be necessary. The size of their region, the climate, the existing cost of electricity and the fact that the bulk of their electricity is produced by public utility suggests that making the comparison is reasonable.

The first day of the hearings Mr. Cavanagh said he had some concern over these. I will address those later, after I have had an opportunity to talk about these. The slide shows the comparison by sector. Ontario Hydro estimates are on the left. The range shows how sensitive the estimates are to the equity question. The council's estimates are derived by taking in the council's expected efficiency improvements, that is if they see in their estimates a 14 or 20 per cent improvement in the electricity over the next 20 years. I have taken that estimate and compared it to the electricity growth in the province, so that we are looking at their expectations compared to our electricity demands. All estimates are shown as average megawatts.

The residential and commercial sectors appear comparable. However, our expectations for the industrial sector seem optimistic when compared to the council's expectations. This points out one of the problems. It includes both the natural, which we are anticipating, and what we have identified as strategic, and there is some concern about the overlaps and whether or not we are double-counting in some of these cases.

To get back to Mr. Cavanagh, he had two major, valid concerns about this comparison. It shows the difficulty in addressing these sorts of problems and trying to develop comparisons. His first concern was that the climate zones were not appropriate. Northwest Power Planning Council uses three zones. The second and third zones are quite comparable to Ontario Hydro. The southern Ontario regime falls directly in their midpoint and northern Ontario is very similar to their zone 3. In using these comparisons, if the population is all concentrated in zone 1, then you run into a problem doing the comparison because the residential potential will be lost.

The other thing he pointed out is that they really are not going after

all the conservation they can get that they have identified. They are only getting what they need. When I did the comparison the problem I had to address was that they had much lower expectations for their economies than we have, so that the comparison I have done is for their high-growth scenario, which is 2.7 per cent. Under that scenario they make it quite clear that they are pursuing all the conservations that are economic. In their high-low growth scenario, they implement all that is possible. That is the comparison I have made here.

There are a lot of other difficulties with this type of comparison. For instance, 46 per cent of their housing is electrically heated, compared to less than 20 per cent in Ontario. There is a lot more potential just in the number of houses out there. They also use a marginal cost for supply at $55 US a megawatt hour which, depending on when you want to do the conversion, compares to $70 or $80 Canadian a megawatt hour, so that in their estimates they are paying for conservation considerably more expensive than our marginal cost. There are reasons why the comparison is very difficult on both sides of the issue, but whether it is over or under is another question.

Before closing I just want to identify some of the major uncertainties in the process. Knowing that something can be done is a long way from knowing how to do something successfully. Poorly designed programs can lead to lost opportunities, unnecessary expense and, worst of all, customer alienation. The previous slides showed that we feel the potential for efficiency improvements is very sensitive to the level of incentives that can be justified. That is an issue we are asking the committee to address.

11:10 a.m.

Both our own research division's experience and the experience of other demonstration programs in the United States warn us that actual changes in demand following retrofit programs can be less than originally estimated. Demonstration programs often produce considerably less conservation than is originally estimated. It is not that the activities are ineffective; it just turns out that many homes may already be improved or else there are structural barriers that prevented the improvement.

There was reference to the Hood River experiment and the very high penetration rate. It is quite true that if you are going to give money away, people will respond. There is no difficulty there. What you have to know is how many can actually respond. The Hood River identified that as one of the problems. They found that there was a much lesser amount than originally anticipated. It was not the delivery problem; it was just a case of not knowing what was out there before you got into the program. That is a major uncertainty. It is a data-base problem.

In addition, people may modify their behaviour by increasing room temperatures in response to lower energy bills after they have insulated their home, or they may perceive that there is an air-quality deterioration and therefore open windows for fresh air. These can all be engineered out, but they are things that are considered part of the uncertainty when you are going on the demand side.

The rate at which customers participate in demand management programs can vary widely. Although poorly planned programs can fail miserably, well planned and well delivered programs appear to achieve penetration rates of 10 to 20 per cent per year. These are larger-scale programs. In other words, they take about five to 10 years to fully saturate the market.

Demonstration programs which offer full incentives can reach 75 to 90 per cent. That is the estimate coming out of the Hood River experiment. Although some United States utilities are beginning to gain experience with partial incentive programs, there is yet very little information to judge their long-term success. We do not know at this point whether, if you provide a 50 per cent incentive you get 50 per cent of what is out there. Do you get 25 per cent or more? It is just another of those uncertainties. We may find that we are successful, but we do not have the data bases at this point.

Energy-efficient technologies, such as ground-source heat pumps, can actually increase the demand for electricity under certain conditions. For example, if they become cost effective from the customer's perspective, they may penetrate a market that was previously served by an alternative fuel. We used ground-source heat pumps in our expectations because they are extremely efficient. They have a coefficient performance of three. In other words, they produce three times the energy required from electricity. We felt that was a very desirable technology and the prices are coming down very well. If you are looking at it as an observation activity, you would see it going into homes that are centrally electrically heated and promoting a ground-source heat pump as an alternative to resistance heating possibly. That would have tremendous energy savings.

Unfortunately, as one can see, if they are that desirable and they save energy, chances are the technology will start to penetrate another market. It may take over some of the gas market, and that is one of the big uncertainties we have in the heating market. Gas is basically a large portion of the heating market. We have a very small percentage of the space-heating market in Ontario and there is a real risk that if cost-effective technologies come along, the saturation can swing very quickly. It is an uncertainty that we have in the new technologies.

In my mind there is not an actual, prescribed use for any particular energy form. It is dependent upon the technologies that are available at any point. Although right now in many cases something like space heating is desirable to be used with gas heating, the technology changes quickly. The market can flip. That is one of the big uncertainties when we are doing demand-side planning.

Finally, our estimates assume that the efficiency improvements included in the load forecast will happen naturally, based on the experience of the last decade. However, the last decade has been anything but typical with sudden price increases and active involvement in promoting conservation on the part of governments and utilities. Sudden increases in the price of gas and oil are not expected and, in the case of electricity, we are forecasting real price declines. We may find it will be necessary to take a very active role to achieve what we call natural in the load forecast.

None of these problems is insurmountable. However, they clearly require careful planning and demonstration if we are going to maintain a reliable supply of electricity for the people of Ontario.

Mr. Chairman: Thank you, Mr. Fleming.

Mr. Marriage: I hope to quickly bring this set of presentations to a conclusion and start hearing your views. We hope these brief presentations and the material we have tabled with you have helped clarify our views on demand management options and their possible role in the future development of the Ontario Hydro system. In concluding this group of presentations, I would like

to highlight some of the selective demand issues on which your views would be of interest to us.

First is a multiple part question. Should Ontario Hydro actively try to influence the use of electricity as we have been describing in our presentations? Should this emphasis be put solely on conservation, on the prosperity growth of the province, or on a combination of both of these?

The second question: In determining the incentives to achieve improved efficiency, which criteria should we emphasize, the nonparticipant, also known as the no loser test, or the marginal cost, also known as the societal test?

As I briefly outlined earlier, the nonparticipant test ensures customer equity. No customer gets an incentive which is paid in part by the other customers. This limits the amount of efficiency improvements which can be achieved. On the other hand, the marginal cost test achieves a maximum efficiency improvement in the province, but requires some of the customers to pay for the benefits to other customers.

The third question relates to the evaluation factors for demand management. I have listed here Ontario Hydro's preliminary list of criteria for evaluating demand management options. They include customer satisfaction, provincial prosperity, total cost, customer equity, resource conservation, flexibility and public acceptability.

We are interested in your views. Are these criteria acceptable? Is the list complete? How would you make tradeoffs between these various factors? These questions are by no means the only feedback we are looking to receive from you, but reflect the scope and breadth of the issues in which we would appreciate input.

The panel is now available to answer your questions and receive your input, both on the demand options and the demand issues. If you like, we can leave up this screen for focusing discussion.

Mr. Chairman: Thank you, Mr. Marriage. Members of the committee?

Do not tell me you are so sufficiently dazzled that there are no questions.

Mr. Ashe: It is all so clear and comprehensive, there is nothing to ask.

11:20 a.m.

Mr. McGuigan: I have not so much of a question as a clarification. One of the things you are telling us here about costing is that in any hydro electric system, whether publicly or privately owned, there is very little cost to the home base when you add another customer. In other words, the economy of scale in this industry is more pronounced than it is in most other industries. If we draw a graph of that economy of scale, it is constantly rising. The bigger you get, and the more efficient you are, you have a fight as to whether it is more cost-efficient to the individual customer and he saves or uses more electricity. The two things are constantly fighting each other in an industry that is so affected by the economy of scale. Am I correct in that assumption?

Mr. Palmer: Economy of scale was a major factor in the electric

utility for a great number of years. A body of opinion that has been around for the last few years says that most of the economy of scale has been used up. The fact remains that the critical mass for an electrical utility is pretty large to be truly efficient.

Mr. McGuigan: If most of the economy of scale has been used up, there are savings to be used in conservation.

Mr. Palmer: We accept that.

Mr. Charlton: I have a whole bunch of questions. Perhaps we will start off with Mr. Palmer and some of the things I raised yesterday. He mentioned in his presentation that yesterday I raised the issue of insulation jackets. I did. I raised it as an indication of a problem that had to be looked at. I do not happen to support insulation jackets as an approach to energy efficiency. I do not believe people should have to buy water heaters and then buy insulation jackets to put around them.

My question to Mr. Campbell, which he partly answered this morning, was if there is some kind of a gap there, why are we not looking at more efficient water heaters in the first instance? The response this morning was that this is happening. I do not know whether it is happening in Ontario Hydro or whether somebody else is developing this water heater that is being marketed.

Mr. Palmer: I can speak to both questions. I believe I mentioned this morning that there is a Canadian standard for insulation levels for water heaters. All manufacturers who manufacture and sell water heaters must meet that standard which has been successful in keeping substandard units off the market. The standard is pretty close to all that can be managed economically with the existing kind of water heater we have, which everyone recognizes. It has a fibreglass-coated tank to give it a reasonably long life. By the way, the average life of water heaters in Ontario is about 15 years. It has insulation and it has another jacket. You can put in more insulation but the saving rapidly becomes uneconomic in any reasonable sense.

The new water heater is just being developed. The impetus for this and the technology began in the US. It is not very widespread yet. One company holds the rights to this development in this country. It offers quite significant promise for improvement in water heaters. Our research laboratories have begun to test some of these heaters and this kind of thing.

Mr. Ashe: Can I get a little clarification on that kind of water heater? Did I not understand you to say--and you did not say it there, so that is why I want to see if my memory is correct--that the current standards for water heaters were based on Cascade 40, which was developed by Ontario Hydro?

Mr. Palmer: Yes, they are.

Mr. Charlton: The other issue which was mentioned this morning--I cannot remember who mentioned it now; I think it was actually mentioned by several people--was the no-losers test. In your presentation at the end, you said you were interested in our views of the no-losers test versus the societal test or the marginal cost test. From my perspective, they both have to be looked at. The societal test is ultimately the more important, but the no-losers test has to be looked at.

I go back to what was some confusion about the question I asked yesterday. I do not know whether the confusion was because of the way I asked

it or the way in which the response was given. I had a discussion with Mr. Fleming after the session last evening. He understood, I think, what I was getting at. I will try to put it again. I got the impression from Mr. Franklin's comments that Hydro was viewing the no-losers test in terms of rate increases, period. From the presentations this morning it is clear that is not the case. The no-losers test is a test which looks at increases above what would have happened if you had gone with the supply-side option; in other words, not just a rate increase but a rate increase above what would have happened otherwise. That is what I was trying to get at in my question yesterday.

Mr. Franklin, in his comments, said that conservation may cause rate increases for those who do not participate in the conservation program. He did not, at least to my recollection, distinguish between a rate increase that would have resulted in any event, no matter whether you went supply-side or demand-side, and an increase above what would have happened otherwise. That is what I want to get clear.

My view is that in terms of the no-losers test, Hydro has an obligation to look at the cheapest way to provide power to the people of Ontario. If there are conservation options which are ultimately going to cost somewhat more than supply-side options, those are regulatory questions which Hydro should not be dealing with. That should not rule out an occasional circumstance in which we might want to go above the no-losers test, but that should be a political decision in Ontario and not a decision made by Ontario Hydro. In other words, when you are setting out all the options and potentials, Hydro's mandate is to provide the cheapest option. There may be social and economic reasons for going beyond the cheapest option on occasion, but that is a decision that should be put to the political arena, as opposed to avoided altogether. It may get avoided anyway, but that is where decisions about those kinds of things should be made. That is my view on those questions.

<u>11:30 a.m.</u>

I have a couple of questions about this definition of natural conservation versus incentive-driven conservation. I got the impression from the presentations this morning that incentive-driven conservation from Ontario Hydro's perspective is driven almost exclusively by financial incentives. I do not care who answers it.

<u>Mr. McConnell</u>: If you are thinking of nonfinancial incentives, such as going out and providing advice to customers on what the facts are, encouraging them to fix a dripping tap, or whatever it might be, that is an integral part of our definition of demand management. However, we separate out the piece in which we go out and have financial incentives from the many activities in which we do not offer the financial incentives. Demand management includes everything that would bring about improved efficiency, or reduction of waste, or utilization of abundant and/or renewable resources in preference to the scarce ones.

<u>Mr. Charlton</u>: The reason I am asking the question is natural conservation has no cost to the utility. Am I correct?

<u>Mr. McConnell</u>: It does not involve a direct outlay of capital expenditure or finance.

<u>Mr. Charlton</u>: It has a cost to somebody. It does not have a cost to the utility. We talked with regard to incentive-driven conservation. We talked

about partial incentives. We talked about conservation in Mr. Fleming's presentation where the utility would have to pay the total cost of that conservation to make it happen.

Mr. McConnell: That is correct. However, our focus is on our customers and the province. If people are wasting electricity, we regard it as a cost to our customers or to the province. Therefore a part of our program is to--

Mr. Charlton: I do not care who answers the question. I go back to one of the slides that Mrs. MacKay-Lassonde had up where she showed some of the estimates of the natural conservation that will occur by 2000. One of the numbers that stuck in my head was that there will be improvements in lighting that run at about 10 per cent. That is your estimate of what will occur naturally by the year 2000.

I can see incentives that could change those numbers dramatically at virtually no cost. Those incentives--I am calling them incentives--relate to action that government can take without setting up a program to help people buy light bulbs.

I was at the Energy '86 conference and I had a discussion with Mr. Fleming and Mr. Shalaby at the end of one of the day's sessions at that conference. We talked about one of the efficient light bulbs that Amory Lovins had been displaying and discussing at the conference. There is no question in the minds of your staff about the efficiency of those units, but there is serious question about whether they were cost-effective.

I think we all know that when something new comes on to the market, it is substantially more expensive than what it will ultimately be. I think we agree on that. Colour televisions started out at $1,500 to $2,000 and now you can pick them up for $350. VCRs started out at $1,000 to $1,200 and now you can pick them up for $345. The rate at which new items penetrate the market has a substantial bearing on the rate at which they will be utilized. There are a number of ways we can get at that--perhaps Ontario Hydro can--in this province without spending a lot of money. We can do it by setting standards.

When I go into the local stores in my community, all I can find are the inefficient light bulbs. I am one individual who happens to know the kinds of places to go to find out where I can get more efficient light bulbs and then I can go and get them. However, we all know that society, as a whole, is not going to do that, especially if it finds out that those rarely used, more efficient light bulbs are very expensive.

I am just sticking to the lighting thing because it was the one figure I remembered. Your estimate of natural conservation in lighting improvements was 10 per cent. We know you can improve the efficiency of lighting by 10 per cent if nobody does anything. That is what you are essentially saying to us. Let me just finish before you respond. What we, as a committee, need to know is what is the real potential for electrical efficiency in lighting if everybody changed to the most efficient light technology, and some estimates of how costs would change if those efficient lighting facilities were being utilized on a mass basis. Economists can do some research into those kinds of things so that we, as politicians, are in a position to recommend to the government of this province actions that it should be taking to see that those things happen.

Mr. McConnell: Just a couple of comments. First, if a new product is put on to the market, we agree that the price will tend to be higher at the

time it is first introduced. If the volume or demand for that object goes up, there will be a tendency for the price to decline, as you have described. In evaluating these options, one has to take that into consideration as to what the expectations are with higher volumes and how a change will take place with time.

The question concerning natural conservation is what efficiency would improve if Ontario Hydro were totally neutral and did not do anything. The natural conservation we are talking about includes our forecasts of inducements by governments, both federal and provincial. It includes expectations of improvements in products that would take place in the United States, Japan, Germany and elsewhere in the world. It is intended to take into account all those technological changes that are going to take place out there. It expects that improvements will take place through research and intensive marketing of manufacturers. When you talk about natural conservation, it is a very complex and large subject. We can track some intelligence from econometric models as to what has tended to take place in the past. It is not quite as simple as you are talking about a few moments ago.

Mr. Charlton: No. I am not trying to suggest that it is simple. What I am trying to suggest is that if all we get is a figure that Ontario Hydro expects, through natural conservation, a 10-per cent improvement in lighting efficiency between now and 2000, we do not know what we should be doing to make more than that happen. We cannot know. Yesterday Mr. Campbell handed around a light bulb and my recollection may be incorrect, but I think he said it used 80 per cent less electricity than the presently utilized incandescent bulbs. Am I correct about that?

Mr. McConnell: Yes.

11:40 a.m.

Mr. Charlton: The 10 per cent natural conservation improvement in lighting efficiency that you are talking about is obviously a very small percentage of the real potential. We may all agree that we will never capture all of the real potential. What we want to look at is how much more than the 10 per cent can we get at for free by government action with respect to standards. For example, do your estimates of conservation, both natural and induced or incentive-driven conservation, include things like standard-setting by government?

Mr. McConnell: Mr. Charlton, I can respond to that in part with respect to lighting. About nine per cent of the energy supplied by Ontario Hydro in the province goes to all lighting. The residential lighting market where most of the incandescent light is used is quite a tiny percentage of all that. In the area of fluorescent lighting, new ballasts that have come on the market within the last five or six years are significantly more efficient. I have forgotten the numbers. Lighting ballasts typically last about 12 to 15 years so as offices and businesses need to reballast in order to keep the lighting in repair, standards that required high-efficiency ballasts to be installed would be significant in the fluorescent lighting field, for which there are no standards at this juncture. I think there is something in that area to think about.

Mr. Charlton: I am saying those are the kinds of things we have to start getting a handle on, because there is a dual process that has to occur here if we are going to maximize what is out there. You people made it very clear both last fall and now, that there is potential which exists which you

cannot get at because of customer preference in some cases and costs in other cases. Those are things we can deal with, but we have to know what those potentials are to know what we should be looking at with regard to whether it is residential lighting, or commercial lighting with new ballasts, or any number of other things regarding the appliance field, the industrial field, or the commercial field.

Mr. Rothman: Mr. Charlton, I am an economist. One of the things that you learn very early as an economist is the aphorism "There is no free lunch." That applies to lighting as well; there is no free lunch. As you suggest, you can legislate, for example, more strict lighting standards. That will not cost Ontario Hydro anything and it will not cost the province anything, but it will cost the people who have to buy the light bulbs something. It is not free. Part of the answer to the questions of what is available, what can we do, and what is the potential, is it depends on how much you are willing to spend, and none of it is free.

Mr. Charlton: I understand what you are saying. We all understand that. We do not have to go through all of that again; we went through that last fall with Ontario Hydro.

I go back to what I said initially. Yesterday we had Mr. Campbell with an efficient light bulb. I cannot remember the figures. He said it was something like 10 to 14 or 14 to 20 times as expensive as a normal light bulb, but it also had a lifespan that was 10 to 20 times longer, or whatever those figures were. Those were the kinds of things he threw at us yesterday.

As we understand it, they are already fairly close to equivalency with regard to cost, which you have got as a capital cost problem or an outlay problem. We also understand, and it has been admitted here, that if we can do whatever is necessary to ensure that those things go into mass use, the price is going to come down substantially, which is going to substantially improve the economics of that efficiency.

We have to have all of the facts if we are going to make the decisions about the things that can be done that Ontario Hydro cannot do. It is not good enough just to know that you sat down and looked at consumers, looked at their preferences, looked at their habits, and decided that lighting will improve by 10 per cent. We want to know what the real potential is. What are the costs? What are the economics of that potential at present? What are the likely economics in mass use? Then we can look at the things we can do in a regulatory way to see that those things happen.

Mrs. MacKay-Lassonde: Perhaps I can add something here. Hedley Palmer mentioned that nine per cent of the electricity we deliver goes to lighting and a small portion of that goes to residential. When you start looking at what you are talking about, it is very simple. You can see we improved 100 per cent, we cut to 4.5, but that is simple. You have to look at very different lighting, residential versus commercial. You also have to look at the penetration rate, whatever incentive you will use and how effective it will be. It will not change overnight; you will not get your 100 per cent overnight. It is a time frame we have to define. These are very difficult questions to answer.

The other thing, which is already reflected in our forecast, is that some of this improvement is already included in that 10 per cent. It is assuming that eventually people will buy those more efficient light bulbs that will come cheaper as well. When you get into the question of a time frame, you also get the additional improvement that will occur during that period of time.

Mr. Charlton: Of course. I am looking for our ability to see the total potential, so we politicians can start to look outside of Hydro at things we can do that you cannot do, not only to speed up the implementation but also to increase the total final line.

Mr. McConnell: Mr. Charlton, we are in a position to communicate to you the potential efficiencies for end-use products. We can communicate to you how much extra energy is consumed with the frost-free feature of a typical refrigerator. Mr. Franklin communicated that to you. That kind of information is available. We also have data on the percentage of the time a typical refrigerator would be running.

There is the practical question, when you are talking about natural conservation, that gets back to Mr. Palmer's comments. We have to try to make projections of how are customers behave and what their wants are. For example, I asked a number of my colleagues when they went home to ask their spouse a question, and I asked my own wife, in the case of a frost-free refrigerator, how much money we could save per month if I were to disconnect the frost-free feature. She looked at me and said, "There is something wrong with you."

Then I asked her a second question. We have over our dining-room table a chandelier that has six light bulbs in it, each 40 watts. That is 240 watts, which is an awful lot of power. We operate that approximately two hours a week when we have our dinner on Sunday evening. I asked her what she would think of saving that energy and doing our bit for conservation by using not the light bulb that Mr. Campbell showed us yesterday, but a more efficient fluorescent tube. She said, "Now you are getting stupid," and turned around and walked away.

When we are talking about the 10 per cent, we are trying to talk about going from that grass-roots information of what is available to considering the whole cycle of human behaviour and going back to what people really want and what people are really willing to do. These are the things Mr. Palmer was trying to emphasize that we learned over the course of yesterday. We can give you the data you want.

11:50 a.m.

Mr. Charlton: Yes, I understand all that. Until government takes action to change what consumers do, you are stuck with looking at what consumers have done. I have no quarrel with that and I understand the problems you have with your wife. All I am saying is that if we set a standard for refrigerators that is substantially better and eliminates your wife's ability to get an inefficient fridge, then you are going to take that into account in your planning, are you not? It is going to change the answer you get.

Mr. McConnell: Yes. If legislation were passed that said that frost-free refrigerators could not be sold in Ontario, you are absolutely right.

Mr. Charlton: Until we get a look at the real potential, none of us know what kinds of things we should be looking at in terms of standards. That goes back to the question I asked earlier, but I am not sure you have answered it yet.

Mr. McConnell: We said, yes, information is available and we are willing to make good.

Mr. Charlton: Do you take the potential for standard setting into account in the kinds of analysis you do?

Mr. McConnell: The answer is yes. Mr. Fleming presented potential in his statement to you today. You can get into the very small detailed applications, if you so desire.

Mr. Snell: You have a 4,000-megawatt potential for conservation in the years 2000 or 2004. Does that include a scenario for stricter efficiency standards on buildings, lighting, loaders, appliances in one of your demand conservation scenarios? Do you anticipate some kind of standard being set somewhere else and plugging that into your scenario and seeing what it would include, or is that above and beyond the 4,000?

Mr. Fleming: To the best of our ability we try to do that. I have to fall back on the fact that our data base is weak. I support Mr. Charlton's position that standards have a very valuable role to play. The difficulty with standards is that, for instance, if something has a very good application and high-volt factor, such as lighting that needs to be on all or almost all the time, it will justify a different standard than the home application that is on only a few times.

Standards play a very valuable part. We are not in the business of defining standards, but I do not think the necessary data exist at present to carry out a proper review of what a standard is. We are in the process of trying to accommodate some of that information.

Mr. Charlton: That was clear in our conversation last evening. There is a very clear need for dramatically more information than we now have at our disposal.

Mr. Fleming: That is right. You will be hearing from Tom Tamblyn--I do not know what he will be talking about specifically--but our consultants are working with us to try to obtain better information on end uses and what we are doing, and what we can expect in terms of improvements. It is quite clear, even from the work we have been doing with him, that good data are hard to come by. It takes a long time to apply them to something.

Mr. Charlton: Let us go back to the other question. Mr. McConnell said that in some way you take standards into account in your planning process, but you obviously cannot take standards that do not exist into account, especially if you are not recommending that they be put in place.

Mr. Fleming: You are right. In the natural expectation you cannot forecast all the changes in standards that will occur. In some sense, they are taken into consideration when we do that upper limit, the marginal cost evaluation of what options are economical. In the chunk of conservation we identify, part of that could be done by standards or paid for by the utility. Standards are one way that may be more efficient from a utility perspective. It may not be that much different from a customer perspective, but standards are clearly one of the ways you would bring about that larger chunk of potential that we identify into the marginal cost.

Having said that, I am not sure we have everything in there, because of our data base again. We did a comparison with utilities such as the Northwest Power Planning Council, and the amount that has been thrown into the pot seems reasonable. If the Northwest Power Planning Council expect to do these things, then the comparison we have done is a very rough estimate of whether our

ball-park figure would also include those things. It is a hand-waving argument. I do not wish to be too specific.

Mr. Charlton: I understand that. The point I was getting at is that all the presentations you have made to us have been useful from a perspective. Our understanding, both last fall and now, is being confirmed that in order for us to get at some of the things that other presenters have suggested to us, and to either confirm or reject the validity of what they are saying, we need one hell of a lot more data than we now have.

Mrs. MacKay-Lassonde: Yes, there is no question about that.

Mr. Palmer: Mr. Charlton, we have had some discussion about lighting. There is a significant point to be made there. I have agreed that there are more efficient ballasts on the market, and lighting could be made quite a bit more efficient. The fact of the matter is that many modern office buildings are built with the heating of the building being dependent upon the lighting system. The buildings have no heating unit per se. They take the excess heating from lighting and store the heat from it for night-time heating when the lights are off.

When one thinks about reballasting those buildings at some time in the future with less efficient light but more efficient ballast, one has to think about how one is going to make up the heat that has been lost by having made the lighting more efficient in order to heat the buildings. That is also a factor in this equation that has to be taken into account.

Mr. Haggerty: We could reduce the heat with all that smoke.

Mr. Rothman: I have one comment to make. Mr. Fleming talked about it but I suspect that there is some notion--I do not know if you have it, but others may--that there is some absolute number we can arrive at as the total potential. I do not think that is correct. We can give you a menu. As Mr. Fleming said, we are trying to get that menu, we agree with you that we need that menu, but the menu says, "Here is what you can get for some dollars."

There is a good deal of uncertainty about how much you can get and how many dollars. That is the kind of menu we would like to be able to have, but there is no absolute. If you wanted to have electricity costing $100 a kilowatt-hour, you would be amazed at how much conservation you could get. You could get even more at $200 a kilowatt-hour. There are no absolute potentials.

Mr. Charlton: I understand that. I am asking, first of all, that we get to see the menu. Second, we should not only look at the menu based on present costs, because present costs are all you have at this point, but also with some estimates of how those costs would change with mass penetration. Those figures will never be 100 per cent accurate, but they will give us an idea of what is worth doing and not worth doing in terms of the question of standards and forcing that penetration at a much earlier time than it would happen by itself.

There is also a whole range of other economic things we can look at and recommend to the government in terms of the changing development of industry in this province.

Mr. McGuigan: A more prominent Liberal than I said the state had no business in the bedrooms of the nation. I am saying the state has no damned business in my living room and it is not going to force me to change to fluorescent lighting.

I went to Hong Kong a few years ago and I took a night trip on the harbour. When you looked up at the hills, all the houses had fluorescent lighting because there is a very high cost for electricity. Looking at the blue hues coming from the hills, you are in another world. You are not going to tell my wife, or anybody else's wife I know of, to go to fluorescent lighting in their living room. You can give us those figures but I am sure they are not going to be of much use to us. Stay the hell out of my living room.

Mr. Charlton: I am not going to tell you anything. We are going to jointly discuss when we get the data.

Mr. Chairman: Have you finished?

Mr. Charlton: Yes.

Mr. Chairman: Mr. Haggerty.

Mr. Haggerty: I should adjourn now. It is 12 o'clock. It would probably be the best thing that happened.

Mr. Chairman: I have a supplementary.

Mr. Haggerty: You have a supplementary. I have some questions here.

12 noon

From your submission today, I came up with a figure of nine per cent. I do not know where I got it from, but there was a list of percentage points given to the efficiency of output of light bulbs, electric motors, etc. You are forecasting for the year 2000 and the end product is that we are going to have about 3,200 megawatts saved by conservation.

You talked about research facilities that Hydro has at present and has had in the past. I want to discuss with you these numbers that came up. Has any research been done into this area by Hydro to confirm those numbers? You are trying to take the best guess you can think of, that there will be additional conservation applied to electrical appliances. Can you confirm that? What research are you doing in this area?

Mrs. MacKay-Lassonde: In the efficiencies where you have seen an improvement, nine per cent for newsprint and three per cent for steel, we do not simply pick these numbers out of the air. We consult with the industry, with other forecasters and with the Ministry of Energy. We look at what is happening in our expectation of improvement in technology. That is how we arrive at those percentage improvements.

Mr. Haggerty: These are already on the market. That is where I was getting the nine per cent probably. Newsprint is the one I had in mind. The new technology in this area has been on stream for the last seven, eight or 10 years, so you are not going to see any change. I do not think you are going to see that drastic a change in the 10 years from 1990 to the year 2000.

Can you confirm some of these things in research? I understand there is another corporation within the Hydro corporation that has research facilities. It has a team of experts who travel throughout the world, particularly for nuclear knowhow and technology. Is there a corporation within the corporation?

Mr. McConnell: Ontario Hydro has a research division. If I understood your question, you were asking whether we do efficiency tests.

Mr. Haggerty: I should use the word "design" rather than "efficiency." Things you may have patent rights on.

Mr. McConnell: We do some work on testing efficiencies of electrical devices that consume electricity. We also do some research that has to do with trying to make products more efficient or at a lower cost or to make them more reliable. Hedley Palmer gave you some examples during this century of such research that has gone on in Hydro.

To add balance, however, we are not trying to do everything for the whole world. We can learn an awful lot from research that is being done by others. Similar kinds of research are being done in other laboratories in the world. Without it costing us anything, we try to take advantage of that knowhow. We are very selective about where we do research. We do an analysis before we adopt a research program that indicates a payoff for Ontario.

We try to put our limited dollars where we are going to get the maximum bang out of our buck. We cited an example where we felt the research that had been done in the past on heat pumps was largely adapted to warmer climates. We undertook to do research to develop a more efficient heat pump for northern climates. We did that and indicated earlier that there was a large benefit to this province as a result of that work. We do research, but we are selective. We are learning from others and we do not do research on everything.

Mr. Haggerty: What costs are involved in your research then? What are we looking at as a percentage of your total operating costs?

Mr. McConnell: As a percentage of our total operating costs, the research we do on electrical tests, improvement of devices and development of new methods is quite modest. At present, it is not a large amount of money compared to our annual expenditure. It is in the order of $3 million per annum for that kind of work. At present, the program is under review because we are thinking about increasing its intensity with respect to both conservation and new electrical applications.

Mr. Haggerty: That is only $3 million out of a fund of about $20 billion. We are looking at billions of dollars here, are we not?

Mr. McConnell: Yes. That is out of some billions.

Mr. Haggerty: Can you give me a quick figure as a percentage of the total? It is far less than one per cent.

Mr. McConnell: That is right. Typically, companies will spend one to three per cent of their annual revenues on research. Most electrical utilities in North America spend zero. You can criticize us for spending too much because we are spending more than most utilities, or you can criticize us for not spending enough. We welcome any comments you have. If you think we should spend more, tell us.

Mr. Haggerty: We really cannot draw a strong conclusion about this 3,200 megawatts we are going to save in conservation. If we lack research in this area, there is not much effort put into it.

Mr. McConnell: Please remember that the research we do, we use as a

tradeoff. We provide our intelligence to other parties and we get all the results of their research. We have an intelligence base that goes far beyond the research we do.

Mr. Haggerty: I am going to drive a point closer to home. We have an ice boom in the Niagara River right now. If you move about six or seven miles from the shoreline of Lake Erie, it is about 75 degrees and as you get closer to the lake it is about 55. The ice boom is encouraging people to spend more money to provide heat to offset the cold from the lake due to the ice buildup. Where is the conservation when there is an ice boom so that people on the lakeshore have to pay more for heat? In some cases, it has gone as late as June. In many cases, homes are heated by electricity.

Drawing comparisons, we have one place where we say we are going to go for some form of conservation, but the ice boom puts the cost up for other people. It will be interesting to find out what research Ontario Hydro does in this area. I had a call about it this morning. I thought maybe there would be a chance for me to work it in today.

Mr. McConnell: I might have misled you. Our total research expenditure is $50 million per year. I was talking more directly in response to your question that had to do with testing the efficiencies and that sort of thing.

Mr. Haggerty: You are probably spending more than that on research on the other end, on Candu and the nuclear side.

Mr. McConnell: That is a piece of it.

Mr. Haggerty: I am talking strictly about conservation, so it is probably far less than one per cent.

Mr. McConnell: We get a great deal of information from research that is done elsewhere. Our knowledge is not limited to our own research.

Mr. Haggerty: It was suggested this morning that you were a leader in the area of research and conservation back in the early 1900s.

Mr. McConnell: Yes. We believe we are in the lead.

Mr. Haggerty: You have fallen far behind in that area.

Mr. McConnell: I do not think we are.

12:10 p.m.

Mr. Fleming: Mr. Haggerty, maybe I can expand on this. We try to set priorities where other people are not involved in the area. A lot of our programs are geared to areas where we clearly see a deficiency externally. For instance, there is a fair amount of work going on in the lighting area. Manufacturers have a vested interest in pursuing research in this area. It is no longer paramount that we take a leading role in research in this area, whereas in other areas such as heat pumps we felt there was a need to improve the applications.

One area of research we feel very strongly about is industrial applications. There are new technologies that are very beneficial to industry. The infra-red technologies, drying and so forth are areas no one is promoting

strongly. Those are areas of research activity. In a sense, we are trying to identify priority areas as opposed to doing everything. That is one reason it would appear we are moving out of certain areas, when in fact we are trying to move into other areas.

Mr. Haggerty: Your forecast of 3,200 megawatts may be rather high. I was trying to help you in this area. Without some definite research in this area, I think you are going to be about 50 per cent too high.

Mr. McConnell: We accept the warning you are giving us. We are worried we may be underestimating. There is an opportunity for more. We are also worried we may be overestimating and we will get this province in trouble. We have both worries. We hear what you are saying.

Mr. Haggerty: I understand one of my colleagues went to southern California. In the mountains, they have windmills along with hydro lines and they are generating much of their electricity by wind. Perhaps some definite research was done in that area. Perhaps Hydro should be looking at getting the price of wind generators so it could be of benefit to Ontario Hydro and to people in the end use.

Mr. Palmer: The wind question in Ontario is pretty well understood. We do not have much wind. It is one of the calmest areas on earth.

Mr. Haggerty: Along the shores of Lake Erie there is all kinds of wind.

Mr. Palmer: There are some areas in northwestern Ontario along James Bay where there may be some significant potential for serving remote communities with combinations of wind generation. We have an experimental study going on.

Mr. McConnell: We have a presentation this afternoon on wind generation.

Mr. Haggerty: I know a successful property owner in Wainfleet township, an area I represent, who has wind generators that have been very successful. I believe he is feeding it back into the hydro line. I do not know whether it is buy-back. I think he is just giving it to you.

Mr. McConnell: No, he is not.

Mr. Palmer: We let him run his meter backwards.

Mr. McConnell: Mr. Haggerty, you cautioned us that 3,000 megawatts might be too high. We acknowledge that and we hear you, but I remind you that when Mr. Hill made the presentation yesterday, he indicated it was 6.3 gigawatts or 6,000 megawatts we were assuming in that example.

Mr. Haggerty: We do not need Darlington then, do we?

Mr. Chairman: With a lack of standards and regulations or whatever else it might take, how do you determine what is publicly acceptable?

Mr. Palmer: That is very difficult. We do extensive marketing and customer research to make sure that the programs we put out for customers will have a measure of acceptance and takeoff. It is not a perfect art. If it were, every manufacturer would be successful in finding the right niche for his

product. There are some weaknesses, but it is better than doing nothing. In that research, we try to gauge the value set for customers; that is, what sort of values they bring to bear on a particular initiative we want to put out. For instance, we are reasonably sure that what one might call the social ethic for conservation is rather low for customers in Ontario. Indeed, conservation per se, which means using less, is a principle that is basically rejected. If conservation means being more efficient and being more efficient means the cost will go down, then it is a desirable thing.

Mr. Chairman: How can you possibly devise a data base on marginal costs with the difficulty you face?

Mr. Palmer: It is nearly impossible. You can look at specific products and if they are widely used, you can look at whether they can be made more efficient and whether it is economic to do so. The heat pump is a prime example of that. A significant saving could be realized by doing some relatively minor things to it.

However, you have tradeoffs with diversity, as we sometimes call it in the electrical business. I mentioned lighting and people in major office buildings providing the totality of heat required in the building. They store heat during the day when they have an excess and they bring it up during the night with pumps and so on. If you reduce the lighting level or ballast in that building, you have a deficiency in the building in terms of heat requirement. The building owner has to find some other means of providing the heat he has lost. He has to factor that into his equation of what it will cost him to change the ballast in the fluorescent lighting. These are economic decisions.

Mr. McConnell: Mr. Palmer partly addressed your question earlier this morning, Mr. Chairman. He emphasized the importance of doing pilot programs on these demand management programs. He indicated that by doing pilot programs, you get a bit of a feel as to how the public feels about these ideas at the time. He gave you an ideal example where we theoretically had a program we thought was going to be good. With regard to the question of public acceptance in that case, people did not accept it. It is difficult, if not impossible, to know how the public is going to accept it before the fact. You have to be listening carefully and watching how people respond to your ideas, and then you have to roll with the punch. Other techniques we mentioned and will be talking more about today are customer surveys to see how people feel about these things. It is very difficult.

Mr. Chairman: If you are developing a data base that is trying to support a marginal cost concept, do you make assumptions that you will have to do certain things to encourage customers to take action? Do you make assumptions on regulations or standards? Do you make assumptions on incentives you might have to provide? How else do you build that data base?

Mr. Fleming: The question of what is marginal is an economic one. You determine your cost benefit based on the provincial perspective. The real question, and one you are identifying, is what is practical, what you can achieve with the various options open to you.

Mr. Chairman: We were told marginal relates to societal.

12:20 p.m.

Mr. Fleming: It does. When an economist talks about a societal

perspective, he talks about putting in all the pieces and coming up with, "Would it not be nice under an ideal society where everything is efficient?" That is a far cry from what society will do. I think you are asking what society will do. What we have identified is one small component of that. If we provide a certain level of incentives, we might get one thing. Mr. Charlton talked about how standards might have an impact on it. I do not think we know all these.

Some are more easily defined. Standards might be more easily defined because you are forcing the issue, but when it is a question of choice you get into customer behaviour models from a theoretical point of view. There are fairly complex, statistical models that look at how customers make decisions and tradeoffs, but even there, having accepted that you can develop a theoretical model that will do it, the real problem comes in getting good data that truly represent what the customers in Ontario traded off in a particular situation.

We are expanding into these areas, which society requires from us, but there is not yet a good data base to support a lot of these models. However, that is how it is evolving. In the absence of that, you would look at other utilities and programs to see whether the success rate in other jurisdictions would justify what you are expecting. At the same time, looking at those jurisdictions, you ask whether there is something obvious that differs from your own jurisdiction that would have explained the tradeoff. That is a much more qualitative approach, but it might give you a ball-park figure for what you can expect. That is why all the demonstration programs, getting back to them, really help you. In our case, demonstrations related to our situation are going to be much more useful than demonstrations outside, but we can gain a lot from the demonstrations from other jurisdictions.

Mr. Chairman: Ontario Hydro is a provincial utility that generates and distributes electrical energy. We are talking about trying to replace some of the request, the demand side, with conservation and other alternatives. How do you get all the players to play in that game? Hydro initiated the residential energy advisory program in which all 300, or whatever, municipal utilities were asked to participate, and probably one, two or three dozen participated; not very many. How do you get all the players involved?

Mr. Palmer: That is quite a difficult thing. As I mentioned, market research is one. Mr. McConnell talked about running pilot programs that demonstrate what you are trying to do makes sense. We have fairly extensive programs such as the load management field trials that demonstrate what might be available in load-management activity.

The time-of-use rate experiment that we have going is providing valuable information, not only about the impact time-of-use rates might have on the system but also how customers feel about time-of-use rates. The users, the customers who are on that experiment, pay the bills they incur by the application of the rates. Within the experiment, there are many different lengths of periods and many different rates and differentials of rates between peak and off-peak periods, so we can get a measure of how effective different combinations are. On the books, to be started this year in some area in Ontario not yet determined, we have some strategic conservation pilot projects to get some measure on this number.

Mr. Chairman: As a committee, we need to isolate where the hurdles are so that we can help get over those hurdles. One of you who made a presentation talked about the problems of individual metering in apartment

buildings. There is very little incentive for a tenant to conserve electricity if there is no return on that action, but if there were an individual meter it would show, and it would reduce the cost accordingly for that tenant. However, the landlord may not want to go to the expense of putting in the individual meter. There is a broader issue too. From the landlord's perspective, the block-rate structure is such that the landlord gets a better deal buying in bulk from Hydro than the tenant would get individually. There are several hurdles and we need to be able to identify them so that we can help get over them. Otherwise, all of this thing becomes part of a speculative reduction in demand without clearly identifying how we move towards achieving it.

Mr. McGuigan: I would like to give an example. If the peak were at the supper hour, probably you would have to persuade the housewife to move the supper hour back an hour or to not wash the dishes until just before she goes to bed. Would that save three, five or 10 cents? What sort of price would you put on those things?

Mr. Marriage: If they all moved, all you would do would be to shift the peak to a different time and you would gain nothing. What you need to do is somehow distribute it, which becomes very difficult.

Mr. McGuigan: A lot of people would not move, including me.

Mrs. MacKay-Lassonde: And children.

Mr. Rothman: Sure you would. If your wife had a dishwasher she could say, "I am going to fill it up and set it now and it will go on at two o'clock in the morning."

Mr. McGuigan: We like to sleep at two o'clock in the morning. We do not want that damned thing shaking around.

Mr. Palmer: Time-of-use rates are pretty close to quite a bit of work I have done in recent years. We have argued the case for time-of-use rates before the Ontario Energy Board several times. The business of what periods you set was a significant issue. We developed quite a sophisticated way of determining the periods related to the cost of producing power in those periods because the Ontario Energy Board specifically asked us that. It then turned out that it led to a very irrational result; namely, in September, which was the month of our lowest loads, the costs were the most expensive.

The reason for that was we took all our big efficient units out of service to the extent that we could to get them ready for the winter. We were using our less-efficient equipment in September in order to make sure everything was tickety-boo for the winter months. The OEB rightly, I think, took the view that maybe costs were not that important. Therefore, the time-of-use rate experiment has convinced me that neither time-of-use rate periods that relate to our load nor those which relate to our costs are necessarily the ones that are going to be the most effective if we introduce them in getting customers to shift load and rates. Those periods have to be such that customers can do something with the length of period. Therefore, neither costs nor loads may be the right answer for selection of periods for time-of-use rates and there will be a proportion of people like you who will say: "I will pay the big number. That is how I want to run my life." That is a choice. People in this generation appreciate having choice.

Mr. McGuigan: There is enough Scotsman in me that if it would save

me $5, I might consider interruption of my sleep but if it would save me only three cents--those are the sorts of things, perhaps, about which you could enlighten us.

Mr. Fleming: From a marketing point of view, if you are going to get something successful, you want to make it so the customer does not know it is happening. Therefore, one of the things we are looking at, for instance, are storage water heaters. In that application, you put in a second tank and heat the second tank during the night-time off-peak period and, in fact, the customer's services might even be improved because he has a larger quantity of water available to him at any time. In that sense, you have developed a technology that satisfies your need and does not have any influence on customer behaviour. In that case, you are bound to be more successful than when you have to modify behaviour. If it is on a voluntary approach, one of the keys is to try to provide alternatives that the customer can use that are not going to affect his lifestyle in any way. That is a key part of the implementation.

Mr. Chairman: Supplementary?

12:30 p.m.

Mr. Charlton: It is not a supplementary. It is another question that came out of this last round of discussion. This is to Mr. Fleming. You said in your presentation that basically your job is trying to integrate demand side and supply side in the planning process. It would seem that a fair bit of the knowledge of consumer preference and consumer behaviour and the impact of a number of efficiency changes that we could be making are over there at the other end of the table in the marketing. Is that any kind of a problem for you in terms of trying to accomplish what it is you are required to do?

Mr. Fleming: I would say not. The intent is consciously to keep as many of the operational aspects as close to the customer orientation as possible. Marketing is doing the demonstrations and all the customer handling. Basically, we would go to marketing to try to collect that information. We are in the same building. It is not that difficult to maintain communications with your counterpart in another part of the corporation. It has not been a barrier.

Similarly, there are a number of parts of the corporation which also have very active roles. There is marketing which is clearly a dominant role. The load forecast department, which is another part of the organization although under the same vice-president, has a very important role to play. There is the research division, again under the same vice-president but in another part of the corporation.

We maintain contacts and we have various committees. We try to sit together and discuss the issues. I do not think the fact that we are in various parts of the corporation is a disadvantage. I tend to believe that is an advantage in many cases because it allows you to take a different perspective than what you get from one particular part of the organization. That is critical when you are doing a review.

Mr. Palmer: A symmetrical point here is that the planning people also have to go to the design and development people on the supply side to get evaluation of options on the supply side. They have the job of synthesis of the information.

Mr. Snell: Within the design and system planning staff what specific

demand-side resources do you have? Do you have people who have demand-side experience and knowledge? When you talk about your job being the one to integrate the two so they are both truly considered in the same manner, who has that experience on the demand side in the systems planning department where it occurs?

Mr. Palmer: They just robbed me of quite a few experts in that field. I have forgotten how many.

Mr. Snell: We heard in the first day, though, what Mr. Charlton is getting at. We heard the witnesses who have dealt with--in one case 60 different utilities, Mr. Jones. Mr. Jones said that a lot of the utilities are bringing the customer, or what you call the demand-side area, under the same vice-presidents as the supply-side planning area so the integration can fully go on. The committee is wondering how that integrated resource planning, as the term is known in the industry, actually can occur when they are under different executive vice-presidents, when they are under different areas, and whether there is any difficulty when you actually are trying to do that now. It is a phenomenal job that you must have if you are responsible for doing that yourself.

Mr. Fleming: I am not the only one. I do not want to give you that impression. I am involved on the demand-side activities. I try to run the material together on demand-side activities. As Mr. Palmer has just mentioned, we have acquired two additional people. One, from the economics and forecasts division, has been involved in a lot of this evaluation of demand-side activities. Another is from Mr. Palmer's group on the rate side and has the experience in load management and so forth. We have acquired two additional individuals recently.

Mr. Marriage: We are also in the process of hiring one more on top of that as well. We are doubling the staff from three to six. The other thing to appreciate is we draw heavily on both the load forecasting division and marketing and utilize their expertise, as well as drawing on research and others. There are only so many people we can put in our own division to do this. But we are expanding, doubling our staff in this area right now.

Mr. McConnell: As far as the expertise is concerned, in terms of understanding our customers and having extensive experience, Hedley Palmer's organization has the focused expertise in terms of understanding customer behaviour and being able to develop practical programs and implement them and so on. At the same time, if we are to go forward in the future as we have in the past by being effective, there has to be a commitment throughout the entire corporation. You heard that commitment yesterday by our chairman, Tom Campbell, and you heard that commitment yesterday with regard to demand management by our new president, Bob Franklin.

Mr. Snell: The chairman advocated an increase in the average electricity intensity in Ontario.

Mr. McConnell: I am sorry. If you listened to the chairman carefully, he spent two thirds of his talk at the front end talking about demand management. I was as surprised as anyone here to find that we came prepared to talk about demand management and found most of the questions on supply. That was the decision of this committee, not Mr. Campbell's presentation. He talked at length about conservation and efficiency.

In any event, to get back to the point I was making, we have three

vice-presidents who are extensively involved. There is Mr. MacCarthy, who is in charge of marketing and who is committed to demand management and trying to balance it with new opportunities for Ontario. There is myself in the power system program. I have load forecasting which is involved in the process. There is system planning under Arthur Hill and our research division. We also have a large organization in our regions which permeates throughout the province. Those regions are assimilating intelligence and attitudes and views throughout the whole province. The intelligence comes into Mr. Palmer. We have to keep in touch with the grass roots.

People get a simplistic notion, organizationally, that you can have one unit that can do everything. It requires more than that. We have to have the whole organization committed to our corporate goals. I think we have that kind of effective structure.

I hasten to add that there are continuous opportunities to improve the organization. I do not question for one moment, and I do not have to have any intelligence at all to forecast, that Ontario Hydro, being the size it is, will continue to change organizationally and will continue to change organizationally relative to demand management as well. There will be changes.

Mr. Campbell: Mr. Chairman, my name was mentioned. Could I comment on one fine point? First of all, may I say that the way our organization works is we put together teams. The groups working on this have been drawn from all parts of the organization, regardless of which executive vice-president they happen to be nominally located under for their pay and rations. We do that all the time. For example, on the problem we mentioned at Bruce unit 2, we will have a group there drawn from the whole organization. We have one policy we can pursue with all our staff regardless of where they come from.

The other point was my comments about electrical intensity. I have said repeatedly, publicly, on every occasion, that there is nothing inconsistent with advocating greater efficiency in the use of electricity. We do that, we will continue to do that and we will intensify that.

There is nothing inconsistent doing that but also saying that electricity should be used to make our economy more productive. Electricity is too valuable a resource to waste; we should not waste it. If we do not waste it, we will have it to help our economy grow. At the same time, we are talking about an economy that is heavily resource based--pulp and paper industry, mining industry, steel industry, automobile industry. Those industries, if you talk to them, are all getting more electrically intensive. That is not a bad thing, because it creates jobs, it creates employment. That is why I urged you to talk to our customers about what they are telling us.

If you pick some model such as California, which does not have heavy resource industry and say, "They are getting less electrically intensive; therefore, that must be a good thing," you also have to check the cost of their electricity. If the cost of their electricity is much higher, then as Mitch Rothman said, you will get much more efficiency and switching of fuels.

In saying we should have more electrical intensity is really another way of saying we should have a good competitive economy here if we are using our natural resources, the advantages we have, which are pulp and paper, mining, processing of steel and manufacturing. If we are using those and creating jobs for people, we are going to have more electrical intensity. That is a fact we have to face. To say that, is not saying we are against conservation or against efficient use of electricity. It is not the same thing at all. It is

recognizing your realities. We also want economic growth in this province. That is what I was trying to say.

Mr. Chairman: The committee stands adjourned until two o'clock.

The committee recessed at 12:42 p.m.

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

THURSDAY, APRIL 3, 1986

Afternoon Sitting

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Leluk, N. G. (York West PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Forsyth, S.

Staff:
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

From Ontario Hydro:
Marriage, E. A., Manager, Bulk Electricity System--Resources Planning, System Planning Division
Meehan, G. N., Senior Engineer, Electricity Transactions, Bulk Electricity System--Resources Planning, System Planning Division
Shalaby, A. S., Supervising Engineer, Supply Planning, Bulk Electricity System--Resources Planning, System Planning Division
McConnell, L. G., Vice-President, Power System Program
Penn, W. J., Program Manager, Planning and Engineering Management, Design and Development Division--Generation
Campbell, T., Chairman
O'Connor, J. R., Director, Public Relations Division
Snelson, J. K., Assistant to the Director, System Planning Division

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Thursday, April 3, 1986

The committee resumed at 2:10 p.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

The Acting Chairman (Mr. Charlton): Now that I see a quorum, we can start. I will turn it over to Ontario Hydro to continue its presentations.

Mr. McGuigan: I realize we are going on with another presentation. If there is any time later on today, I would like to go back to the question that was asked this morning about cross-subsidization. I would like to spend some time talking about that, but only if there is time available.

The Acting Chairman: Fair enough.

ONTARIO HYDRO

Mr. Marriage: I will lead off this set of presentations on the supply options. We will be making six presentations on some of the aspects related to supply options. I will be making the first presentation, quickly reviewing the supply options considered in phase 1 of our demand and supply options study. This will be followed by a number of selected presentations.

The second presentation is on electricity purchases from Manitoba and Quebec. This will be based both on our phase 1 demand and supply analysis and on the current negotiations. Mr. Meehan will be making this presentation.

The third presentation will be on independent generation in Ontario of electricity owned and operated by others. This generation effectively reduces the capacity in energy demands on the Ontario Hydro system, either by reducing the customer's load or through purchases by Ontario Hydro. Amir Shalaby will be making that presentation.

The next presentation will be on Ontario Hydro's hydraulic development program. Bill Penn will quickly highlight the studies of hydraulic potential and deal with three projects we are actively pursuing. Mr. Penn will also be presenting some selected alternative generation technologies: wind, solar-photovoltaics and clean-coal combustion.

I will be summing up and concluding the presentation, highlighting some of the supply issues on which we would be interested in having your views. Because of the time constraints of this hearing, I will be touching, as will the other officers, on only some of the highlights in these presentations. As we noted before, you can find more information in our written presentations and in the two reports we noted earlier.

I would like to move to my presentation on the review of the supply options. In this phase, we evaluated a wide range of options that we considered both technically feasible and commercially available in Ontario. These options included major energy producers, such as hydraulic, coal and

nuclear; electricity purchases, hydraulic power from our neighbouring provinces of Manitoba and Quebec; the alternative energy technologies, such as cogeneration, wind, solar, small hydro and fuel cells; and energy storage technologies, including pumped hydraulic storage, compressed air and batteries.

Within each of these categories, we also looked at a wide range of alternatives. Taking coal as an example, we looked at unit sizes, from 200 megawatts to 1,300 megawatts. We looked at the number of units per plant, from one to four, and we looked at different design technologies, including burning gas produced from coal.

As we indicated in presentation 4D the other day, these are all compared on a standard cost and provide a rough screening. I will not be going through all the pros and cons in my presentation, but will try to highlight some of the more key ones to try to finish this thing today.

I would like to move on to the major energy producers. These are really our traditional options of hydraulic, coal, nuclear, gas and oil. Except for hydraulic, which is limited by storage capacity and rainfall, what distinguishes these options is that they can produce energy pretty well all the time as the system needs it. They do suffer, however, from long lead times, based on the current approval process and including design and construction times, which could total up to 14 years or possibly even more.

I would like to note, in terms of this table which identifies these options, not only did we look at cost, we also looked at the technical feasibility. We also looked at energy security and fuel security. We also looked at environment, just to highlight a few of them.

Hydraulic and nuclear continue to be the most economic and reliable source of electricity when units have to operate for more than 40 per cent of the time. Of course, the hydraulic system is limited by its geographic location and dear old mother nature.

Despite the new technologies to be able to reduce acid gas emissions, it may not be possible to expand our coal program economically to maintain emissions within the regulations. Of course, oil and gas are extremely risky options in terms of the uncertainty about fuel prices.

The subject of electricity purchases is going to be covered by Mr. Meehan. I will pass on that one and let him deal with that in his presentation.

Alternative energy technologies, including cogeneration, municipal solid wastes, small hydro, solar, wind, wood, fuel cells, suffer from some of the other factors in terms of weather and operational constraints. By their very nature, in most of these cases, they are limited both in size and location.

We have looked at a wide range of the options. Although some of them may not be able to make a significant contribution to the bulk power system, they can make a useful contribution in remote communities to displace diesel generation.

In general, these options do have shorter lead times than the major energy producers. However, taking cogeneration and municipal solid waste generation as an example, they are highly dependent upon a number of factors, including size. They are affected by whether existing facilities exist or not, as well as the redevelopments on small hydro. They are also a function of

electricity prices and other fuel prices, and that impacts on the fuel cells as well. The customers needs will affect these. Again, mother nature certainly affects the hydraulic potential and land requirements.

Many of these technologies may be suited for developments by private industry or municipal utilities to supplement their needs. Amir Shalaby will be dealing with that in his presentation.

As I indicated earlier, wind and solar will be dealt with by Mr. Penn.

In terms of energy storage technologies, as we have seen, electricity demand varies daily, weekly and seasonally. Although electricity cannot be stored, other forms of energy can. The energy storage technologies absorb electricity during low periods and make it available during the peak periods when the production costs are higher. As we have noted earlier, the energy storage options are limited to 1,000 megawatts due to load patterns and system requirements. All of these processes are somewhat inefficient in that it requires about 30 per cent more energy for the storage process than the energy you can produce.

The options: Broadly, the most conventional one we have looked at is hydraulic pump storage, where we use electricity at night to pump water from a lower reservoir to a higher one and then produce electricity during the day from that stored energy. However, like conventional hydraulic, it is limited by geographic considerations and, again, mother nature.

Underground pump storage has some advantages in that we can possibly locate it close to some of our existing plants, such as Lakeview and Pickering. This would minimize the transmission requirements and minimize some of the impacts of both an upper and lower reservoir from an environmental point of view.

Compressed air storage: That system uses a combustion turbine fuelled with oil and gas. Although it has low capital costs, it has a high operating cost. Batteries, like the ones in your automobile, suffer from a relatively short life, which increases their capital cost. They become really uneconomic in terms of major generation.

Mr. McGuigan: A short question. What is the efficiency of compressed air? You say it is 70 per cent for--

Mr. Marriage: It is about 70 per cent as well.

Mr. McGuigan: It is about the same.

Mr. Marriage: Yes. Moving right along here at a rapid pace, I would like to touch on the standard costs shown here and the dollars per megawatt-hour in 1984 dollars for the options added to the power system in the year 2000 to supply an increment on load. There is a wide range in these costs. The cost for coal and nuclear will range because of the size of the units and also the different technologies within those units and the different numbers of plants.

2:20 p.m.

The hydraulic also varies considerably because of site-specific conditions. The purchasers will also differ because of purchase qualities and the various arrangements we can make.

Cogeneration, again, varies quite widely. It depends on the fuels and also the technologies within that option. It is the same with municipal solid waste. It can vary quite dramatically, depending on the fuels and the technologies used. There is a wide variation between solar and wind.

The important thing is to see here--again based on a rough screening--that the attractive hydraulic sites of the remaining potential are quite good compared to some of the other supply alternatives.

The multi-unit nuclear plant for producing base-load energy is one of the more attractive options. The coal option is significantly higher than the nuclear option for producing large quantities of energy, but with emission controls it could be quite a viable option for peaking or intermediate purposes less than 30 per cent of the time.

The purchasers certainly are competitive with coal and, as Mr. Meehan will be discussing, we are trying to negotiate to see whether we can get it closer to nuclear cogeneration and municipal solid waste.

As I say, cheaper cogeneration and municipal solid waste are based on existing facilities in most cases and using waste fuels, whether it is garbage, biomass or wood chips, whereas the upper one is using natural gas in this case. These would be brand-new installations operating on premium fuel. Wind and solar, of course, are too expensive, we feel, based on what we know today in terms of technology and costs.

The potential: Again, there is a lot of information in the report. I want to touch on just some of the key aspects. The potential for coal and nuclear is primarily limited by lead times. These could be up to 14 years, with five to eight of these for the actual construction and five to eight for the approval process.

Hydraulic, as I say, is really limited by nature, economics and technical feasibility of the remaining sites. We feel there could be about 3,000 megawatts potential by the early 2000s, and that is identified in the reports.

Both hydraulic and nuclear utilize indigenous fuel sources within this province, whereas coal is going to depend on imported fuel.

The cogeneration and municipal solid waste primarily will be limited by the incentives offered. They can use indigenous fuels sources, such as some of the waste products, or they may depend on imported fuel. The purchases will basically be limited by what the other provinces are prepared to build for us, the pricing arrangements we make and the transmission considerations.

Wind, solar and some of the other alternative technologies, we feel, do not have much of a contribution to make to the bulk system, but certainly have an application in remote communities where they can compete against diesel generation.

In summing up, we have evaluated a wide range of the supply options. We have found a variety that are available and cost-competitive. Others may be expensive now, but could find applications in remote communities; or, as technology develops, these could become cost-competitive in the early 2000s.

The choices on both the supply and demand options need to strike a balance in terms of both our future energy requirements and the need for peak-load requirements. That affects the different options. The choice is not just on economics, but as we have indicated in the evaulation factors in 4D, we have to look not only at the system requirements and economics, but also at flexibility, the provincial economy and public acceptance. These are only a few of the ones there.

One point I would like to make. It takes several years for the study, design and approval of a major supply option. Therefore, although work may be starting, or has started on some of these, the major capital commitments would not occur for several years and neither would the commitment to build.

I hope the following presentations will provide a bit more insight into these options: the purchasers, the independent generation in Ontario, the hydraulic generation and a few of the alternative generation technologies.

We would have liked to talk a little more about nuclear and coal because we feel they are very important options which have more long-term potential than most of the other options, but due to the time constraint and the number of reviews--

Mr. Sargent: What do you call long term?

Mr. Marriage: Forty years, 50 years.

Mr. Sargent: Twenty-five, 30 years.

2:30 p.m.

Mr. Marriage: Whether you replace them or not, as an option they have a long-term potential for this province.

We have included some additional information on the coal and nuclear options as appendices to this presentation. Now I would like to call on Neil Meehan to address purchases, which is the first of the topics.

Mr. Meehan: You have already heard that my name is Neil Meehan. I am senior planning engineer, electricity transactions, and I report to Mr. Marriage. Among other responsibilities, my section concerns itself with mid-to-long-term export sales and mid-to-long-term purchases from other utilities, essentially beyond the next five years. It is the purchases that I am here to talk about today.

In this presentation, I will discuss the options of purchasing electricity from Manitoba and Quebec, purchasing what is called firm power and firm energy. It is the kind of power and energy that will require Manitoba or Quebec to construct generating facilities and transmission facilities to meet their obligations. It is not surplus electricity.

The presentation is divided into three parts. The first part relates to the demand and supply options study, phase 1, the alternatives we considered, the costs we used and the results we obtained. I will compare them, as Art did in his earlier slide presentation. The second part relates to subsequent developments. I will have a bit of background, some alternatives we are now looking at, the transmission involved with those alternatives and some of the pricing concepts we use as we are talking to both utilities. The third part is

a little food for thought. It is a short list of favourable and some unfavourable characteristics about the purchase option.

In phase 1 of the demand and supply options study, we used information that was available in the spring of 1985. Talks were only getting started, and so we had to make many assumptions. We alone picked the sizes of the purchases we looked at, and they were based on system considerations. Essentially, we picked a small one that did not need transmission in Ontario and we picked a large one that the system was capable of handling but that did need major new transmission. The prices we used were based on rough estimates of what we thought were the generation costs and the transmission costs. These were our estimates, and that was because negotiations had not yet begun.

For the Manitoba case, we looked at 300 megawatts and 1,150 megawatts delivered into Ontario. We assumed the Conawapa site on the Nelson River very near Hudson Bay would be developed and that in the 1,150-megawatt alternative, major transmission would be needed both in Manitoba and Ontario. In my next slide I will talk more about that. I have a map to show you.

In the Quebec case, we looked at 775 megawatts and presumed that existing generation on the Ottawa River owned by Hydro-Québec could be isolated or disconnected from its system and connected to the Ontario Hydro system. With that alternative, we did not need any transmission in Ontario. We also picked a 2,000-megawatt option that required generation to be built in the James Bay area and major transmission to be built into Ontario.

We looked at two sources in Quebec and two delivery points in Ontario. The costs in Quebec that we used were based on what was known as the NBR complex. That stands for the names of three river systems, the Nottaway, the Broadback and the Rupert rivers.

Back to Manitoba for a minute: The Nelson River flows into Hudson Bay at this point. Conawapa is located about 80 kilometres from Hudson Bay. We assumed the station there would be 1,300 megawatts and that it would deliver, as I said, 1,150 megawatts into Ontario at Thunder Bay. The costs that we used presume the transmission would have to be built from Conawapa to Winnipeg into Thunder Bay and also pass Sault Ste. Marie to a place near Thessalon which we call Mississagi. All of that transmission would have to be built to accept 1,150 megawatts from Manitoba. We also looked at a diagonal route which, instead of being 1,500 kilometres long, was only 1,000 kilometres long. That was an alternative we looked at. Manitoba has since ruled that out as an option.

In the small 300-megawatt purchase, we presumed Manitoba would do the same thing; Conawapa would be developed and transmission to Winnipeg would be built, but we did not need any transmission in Ontario, as I mentioned.

On the Quebec side, we looked at two sources: NBR and the La Grande complex. For simplicity, we assumed that 2,000 megawatts of generation could be built at NBR and delivered into Sudbury. That distance is 730 kilometres. The other alternative we looked at was to presume that the generation would originate at La Grande and would be delivered into the Ottawa-Cornwall area, a distance of 1,100 kilometres.

The distance is more dependent on the location of the generation than it is on whether it is Sudbury or Ottawa-Cornwall. They are very much the same. It is 50 kilometres longer, I believe, to the Ottawa-Cornwall area than it is to Sudbury.

We developed costs for those rough alternatives we had and we developed the standard costs, which you have already heard about, on a basis similar to all the other options. These were based, as I have said, on the costs to construct and operate generation in Manitoba. Price negotiations had not started so there is none of that input in this. We did many sensitivity tests, and these are reported in the report to which Mr. Marriage referred, 652SP.

Mr. Sargent: What is a sensitivity test?

Mr. Meehan: We tested for different prices of oil or different economic conditions. A lot of the options considered in the study were placed into different scenarios and they get different results. One option might be good in a normal economy; another option might be better in a high-growth economy, this sort of thing. The options were tested.

The width of these standard costs for the Manitoba and the Hydro Quebec options is narrower than the one Mr. Marriage showed you on his chart. That is because I have removed all the sensitivity tests and I have just the bare bones of what we looked at. If I had included the sensitivity tests, the range that is shown here would have been a little lower and considerably higher. This shows--basically this is what we were wondering about--that the purchases are worth pursuing. The economics are in the right ball park. It also shows there is no free lunch here, I think.

Mr. Sargent: How can you be in the right ball park when the dismantlement cost of nuclear power is enormous--up to $1 billion to mothball one plant?

Mr. Meehan: I am saying the Manitoba and Quebec purchases--

Mr. Sargent: If your building cost equals the dismantling cost in nuclear power, that is not a fair picture at all. How could it be?

Mr. Meehan: Compare it with this one then, the coal alternative in Ontario. These things look good relative to that alternative. I am not contesting whether this really looks good. I put this on as an example, Mr. Sargent.

Mr. Sargent: I see.

2:40 p.m.

Mr. Meehan: The two I am talking about here are the ones in the middle. They are falling within the range of these two other supply options. I have not put any of the demand options on there to compare either. We have to treat these results with a great deal of caution since there is no negotiated input in those numbers. Manitoba and Quebec have not taken part in anything that went into those numbers.

Turning to our current negotiations, we are negotiating with both Manitoba and Quebec for purchases that will begin in the mid-to-late 1990s. These talks are under way. We signed a letter of intent covering the studies and the negotiations with Manitoba. These are covering studies and not for the purchases of power. That would come along later. One was not deemed necessary with Hydro-Québec, and so we did not enter a letter with them.

With Manitoba, we are talking about 150 megawatts to 1,000 megawatts for up to 35 years in duration. With Quebec, we are talking about 750 megawatts, similar to the 775 megawatts I referred to earlier. More realistically, it is now 750 megawatts. We are talking also about 2,000 megawatts and 4,000 megawatts for up to 30 years.

The large ones, in particular, require immediate construction of generation and transmission. Even for the small one, Hydro-Québec must isolate generation on to our system. They have to make up that generation somehow and they would have to build other generation on their system to make that sale.

In Manitoba, we are considering Conawapa, as I have mentioned. In Quebec, we are looking at the James Bay area. On the next two slides, I think you will see that a little better. Conawapa is 80 kilometres, as I mentioned, from Hudson Bay, 820 kilometres from Winnipeg and another 200 kilometres from the border. To make the large 1,000 megawatt sale to us, all of this transmission here, Winnipeg to Thunder Bay and Thunder Bay to Mississagi, near Thessalon, would have to be constructed.

Mr. Haggerty: Regardless of whether you purchase the power from Manitoba or not, you still have to build that line from Thunder Bay to Sault Ste. Marie.

Mr. Meehan: Yes. This would be an advancement.

Mr. Haggerty: That has to come eventually.

Mr. Meehan: Yes. This part of that line would be advanced. The first phase of that line would be advanced only one or two years. Other larger phases would have to be advanced eight or even 13 years to bring it up to maximum power. It is an advancement of that.

Mr. Haggerty: That is right. It should not be tied into the cost of actually purchasing power.

Mr. Meehan: No. When we do our studies, we would only include the cost of advancing it. That is part of the economic assessment.

Mr. Haggerty: It should be a separate cost.

Mrs. Grier: What are the transmission losses with that distance? Is there a percentage that one can look at?

Mr. Meehan: We do not know exactly. If this were a 1,300-megawatt station, we presume that arriving here it would be 1,150 megawatts. There are 150 megawatts lost on that. That is more than 10 per cent.

Mr. Snell: Why would it be brought all the way to Mississagi?

Mr. Meehan: It is not necessarily brought all the way here. The system in this area of the province is relatively weak from a transmission point of view and there is nothing as large as 1,000 megawatts in this part of the province. We have to be ready to lose that 1,000 megawatts, and the entire part of the system would collapse if this were not in place. We could not consume 1,100 megawatts in that area.

I mentioned we are looking at 150 megawatts to 1,000 megawatts. In the intermediate range, we are looking at around 500 megawatts, in which case, Manitoba would still have to build to Winnipeg. This piece here would not have to be built and the first phase of this would have to be advanced as before, but only by a year or so.

We are also looking at 150 megawatts to 200 megawatts, in which case we would not have to build any transmission. We would not have to build this, or this would stay on its schedule as it is without the purchase.

In Hydro-Québec, there are three areas where generation can be found: La Grande, which is extensively developed now, although there is still capacity available in the thousands of megawatts on that river system; Grande Baleine, which is 250 kilometres north; or the Nottaway, Broadback and Rupert complex, which I talked about earlier. All these sources can be developed for a sale to Ontario or to somebody else.

One of the schemes under consideration is to build 2,000 megawatts of generation at one of these locations and to transmit it into Cornwall. Another idea is to build at one of those three locations and transmit it into Sudbury. We have now discovered there are technical reasons where very likely only 1,500 megawatts could be accepted into Sudbury, but that does not change the work that is under way.

Mr. Haggerty: Would you need the line down to Cornwall then, or is that for the interconnections?

Mr. Meehan: Do you mean this line?

Mr. Haggerty: Yes.

Mr. Meehan: No. This presumes that all the work being done in this area would already be under way. This is in the late 1990s; so anything that happened before then would already be in place.

Mr. Haggerty: You would have a use in eastern Ontario for that power from Quebec.

Mr. Meehan: Yes, but the power we would buy would not remain just in eastern Ontario. It would be transmitted down towards Toronto.

Mrs. Grier: Those are two alternatives, though. You would not need both those lines.

Mr. Meehan: That is where you get the 4,000-megawatt option I mentioned. If we did want to buy 4,000 megawatts, we would need both locations.

Mrs. Grier: If you pursued the option of taking over a Quebec generation station on the St. Lawrence River and have Quebec make up the power somewhere else, what does it do to the transmission picture?

Mr. Meehan: We would not require any transmission in Ontario. The generation I am talking about is located along here. There are 250 megawatts here and 500 megawatts in the Ottawa area. Quebec would advance generation up here and build transmission into the Montreal area. That would have nothing to do with us.

Mr. Haggerty: Are the 500 megawatts from Ottawa from hydraulic facilities on the Ottawa River?

Mr. Meehan: They are already located on the Ottawa River.

Mr. Haggerty: I thought there were some access sites that could be revamped or put back into production.

Mr. Meehan: No, we are not considering any of that. This is taking existing generation and isolating it on our system. Our discussions are actually concentrated on the larger purchase at this time. These three things are all on the table. We are concentrating on something in the order of 1,500 or 2,000 megawatts.

The other remark I should make at this point is that if we were to buy 2,000 or 1,500 megawatts, or up to 4,000 megawatts in this area, it could affect the other transmission that I have not shown in this drawing. Taking all that power into this end of the province could affect the requirement for transmission here. That would have to be studied.

I would like to turn now to the pricing concepts that are on the table. If you remember, in the demand and supply options study, phase 1, for lack of something better, we based our pricing ideas on the cost of building facilities in the other provinces as best we could. With negotiations still in the early stages, where we are focusing on pricing concepts rather than specifics, it now seems more likely that the price will be based on our alternative cost. Quebec and Manitoba have both approached their sales to the United States this way as well. They find out what the other party is having to build as an alternative and work to a percentage of what that alternative might be. It looks as though that is where we are going. For pricing purposes, at the moment we are presuming the alternative in Ontario is nuclear generation.

2:50 p.m.

Mrs. Grier: Why is that?

Mr. Meehan: Why nuclear?

Mrs. Grier: Which is higher: the cost of generation or the alternative cost based on nuclear?

Mr. Meehan: They are both in the same order. In order for Hydro-Québec or Manitoba Hydro to be interested in selling to us, the price would have to more than cover their costs. When I said it is based on nuclear, I did not suggest the percentage would be 80 per cent; it might be 105 per cent and because Hydro-Québec is represented here today, I would like it to be 60 per cent of the nuclear cost.

Mrs. Grier: I realized they were here.

Mr. Meehan: We are not at the point of determining that in our discussions. We wanted to use nuclear as the basis in our discussions because it behaves nicely over time. It may start a little higher than a coal alternative, for instance, but it remains low as the years pass. We picked nuclear, and I think it is a more realistic alternative than coal.

Mrs. Grier: When you make other comparisons, you always seem to compare things to coal. The pro nuclear argument is that nuclear is so cheap.

Mr. Meehan: It would be better for us to pay 105 per cent of a nuclear estimate, than to pay 80 per cent of a coal estimate. Over the life of the thing, we are trying to use the best estimate we can as the basis, and the most realistic too. I am not standing here suggesting that I do not think nuclear is a reasonable option for Ontario as an alternative to the purchase.

Mr. Haggerty: You talked about a firm price in negotiation with either Quebec or Manitoba. What are we looking at in cost per kilowatt, if you were to buy it over a 30-year period? Are we looking at five cents, four cents or three cents? Would we get the same deal that Quebec got from Churchill Falls?

Mr. Meehan: I am afraid not. That comes up in our talks from time to time.

Mr. Chairman: I am interjecting here to say that we have a fairly weighty number of items to cover this afternoon. We are wandering from the schedule. I am leaving at five o'clock; I do not know about the rest of you.

Mr. Haggerty: I thought you were asleep long ago.

Mr. Meehan: It might be important to note that both these utilities have other good markets in the States. That may affect our price. I am just about finished here, Mr. Chairman.

Part 3 is a very short list of favourable characteristics, which are not necessarily unique to the purchase option. It is quite straightforward: (1) renewable resource; (2) indigenous to Canada; (3) energy diversity for Ontario and perhaps better energy security; (4) the environmental impact in Ontario is limited to transmission--in some of these cases, however, there may be considerable transmission--and (5) there is the post-contract value of the new interconnection. Interconnections have always been a good thing. If we have an interconnection with Quebec at the end of the contract, I am sure it will be a good thing as well.

On unfavourable characteristics, one might think of the fact that most of the jobs, particularly construction jobs, will be found outside Ontario. There is limited flexibility with the purchase option in that we have to commit ourselves very soon if we want to have something in place by the mid-1990s to late-1990s. It is not indigenous to Ontario. If you were to compare it to something that was indigenous to Ontario, this would be less favourable.

We do not have the same control over the schedule, the in-service state of the facility, as we would if it was something in our own backyard where we could pour the resources into it if we wanted to. Most important, it must be replaced after the contract is terminated. If it is a 15-year or 20-year period, sooner or later we will have to replace it with demand and supply options. There is longer-term benefit in these other provinces than in Ontario. That wraps it up.

Mr. McGuigan: If we had these conservation things and possibly new technologies that reduce the demand, it would be a good system to give up at the end of 30 years, would it not?

Mr. Meehan: Yes. That could be true.

Mr. Chairman: Talk quickly, Mr. Shalaby.

Mr. Shalaby: Good afternoon. My name is Amir Shalaby. I work for the bulk electricity system, in the resource planning department, with most of the people who are here this afternoon. I am a supervising engineer for supply planning. Among my responsibilities is monitoring and advising on the potential of what we call independent generation, or small power producers or parallel generators. That is the subject of this discussion here.

I have changed the length of this discussion three times, and for a fourth time now Mr. Hill has asked me to shorten it even further. I will be brisk.

The presentation outline would include a brief description of what is happening now in Ontario in the area of independent generation. I will then move to tell you how much more can be developed in that field, what makes developers tick, what makes them go on and develop generation and what the current policies in Ontario look like. I will also talk of several initiatives that are under way, both within Hydro and government departments. Finally, I will summarize by describing what we see as the role of independent generation in Ontario.

The current status of independent generation in Ontario is that 95 per cent of the electrical energy consumed in Ontario is produced by Ontario Hydro. The rest, or five per cent, is produced by these independent generators. Much of what they produce they use for their own purposes, and only a small fraction of that five per cent is sold to Ontario Hydro and made available to other customers.

Much of the type of technology used is hydraulic. About 500 megawatts is thermal and that is mostly natural gas fired.

Independent producers are industrial and commercial enterprises, private developers and private utilities. The majority of the production is from private utilities and from energy-intensive industries such as chemical, mining and forest industries. Next week you will be seeing a real live independent producer. I think the owner of Galetta power station is going to come to address the committee.

How much is yet to be developed? There are 1,200 megawatts already in place. We feel there is probably just as much, or perhaps more, that could also be developed. Much is in the cogeneration area.

Small hydraulic and municipal solid waste are two sources that are limited by either the availability of small hydraulic sites or the amount of waste from which you can incinerate and generate electricity.

I want to emphasize that these 1,400 megawatts, or perhaps more than that, will need incentives of some kind or another to be developed. We do not expect to see that developing under normal market forces; it will probably need several incentives to get on.

What makes cogeneration, small hydraulic or municipal waste development attractive? If you are a private developer, you are looking at an investment. If you get a good rate of return, you go ahead and do it. In general, these

factors would make the rate of return attractive. If electricity is expensive from the utility, then it will make sense to manufacture your own. However, if electricity is cheap on the market the incentive is less. If you can develop the small hydraulic site at low cost, that makes it attractive; if you can get a good financing package, that makes it attractive; if the environmental impacts are manageable, and therefore the mitigating costs are low, that would make the facility attractive.

Small hydro, municipal waste and cogeneration have small differences in their characteristics that make some other factors important in addition to these four. For small hydro, you must have a good site, accessible by road, with good civil works and close to transmission.

A high purchase rate from the utility is important because a small hydro developer's main bread and butter is selling to the utility, not using the electricity himself most of the time.

3 p.m.

On municipal solid waste, something called the tipping fee is important to make the scheme go ahead. This is a fee the developer collects from those who are dumping the garbage on his site. The municipality will pay an electricity generator some money to take the garbage. That is referred to as a tipping fee.

Also, there are a number of players in the municipal solid waste business and they have to play together. They include those who use the steam, dump the garbage and generate the energy. That is usually an important factor as well.

On the next slide you will see the factors that make cogeneration attractive: low fuel costs, whether it is natural gas, distillate oil or industrial byproducts such as spent pumping liquor or furnace gases. If you have a low-cost fuel of assured long-term availability, that will make a cogeneration scheme attractive. If you have a lot of demand for steam, that will make the economics of the machinery attractive. If you have a high purchase rate at which to sell your surplus to the utility, that will make it attractive. Then there is something called standby power. That matters to industrial customers quite a bit. I will not get into it right now.

The intent of this slide is to show that there are a number of factors in Ontario that encourage independent generation. Among them is the fact that Hydro is willing to interconnect with the independent generators, buy the surplus electricity, pay avoided costs and provide standby power at no standby charge. Ontario Hydro raised the purchase rate significantly in the last 16 or 18 months, almost double, and is willing to pay avoided costs.

The government is doing a number of things. This is not an exhaustive list. There are favourable tax treatments in our financing and demonstration projects. There is also an effort to streamline the approval process for developing small scale hydro.

Mr. Sargent: How much does Hydro pay per kilowatt hour for that kind of power?

Mr. Shalaby: About three and a half cents per kilowatt hour.

Mrs. Grier: Is that a significant increase?

Mr. Shalaby: It used to be less than that. We feel that rate reflects the long-term avoided costs.

Mr. Sargent: In California they pay seven cents per kilowatt hour to independent producers.

Mr. Shalaby: Yes. That is because they generate electricity from oil and gas and it costs them that much to generate electricity from their own machines.

Mr. Sargent: No. It is from cow manure.

Mr. Shalaby: No. The utility, Pacific Gas and Electric, burns natural gas.

Mr. Sargent: They are using cow manure as their source.

Mr. Shalaby: Not the utility; the independent producers are.

Mr. Chairman: Stay away from them.

Mr. Sargent: From the sublime to the ridiculous.

Interjection: I was waiting for the horse manure.

Mr. Shalaby: It depends on what fuel the utility is burning. It costs us two cents to produce electricity from coal today and we are paying three and a half cents. In California it may be costing five or six cents to produce and they are paying that much. It depends on where that price is and what the utility is using.

We are now going to current initiatives. In addition to the policies in place now, Ontario Hydro is initiating a major cogeneration program that will identify sites and initial opportunities with customers. We are also reviewing policies, incentives and purchase rates. Policies include small-scale hydraulic policies on how to co-operate with the private sector in developing small-scale hydraulics. The government is also doing a number of things. Perhaps I should leave that to the representatives of the Ministry of Energy who will be presenting their views to the committee.

In conclusion, I would like to emphasize that Ontario Hydro is actively pursuing economic opportunities. Have I skipped one? All right, maybe I will do that one.

In our view, the role of incentive generation is most suited when the opportunity for small-scale technology matches things like waste disposal. If you have a waste disposal problem, then independent production of energy is a suitable thing. If you have a wood chip waste or garbage disposal problem, that is a good idea. If you have a level of demand for steam in a heavy industry that is an intensive energy user, cogeneration is a good idea. Remote communities were mentioned several times as candidates for independent power production and small technologies. Finally, small hydro as a private development by independent producers is a good opportunity as well. These are places that will find favour in the independent production.

In conclusion, Ontario Hydro encourages economic development. Small hydraulic and waste are limited resources, 400 megawatts or so. If independent

production is to contribute significantly to the province, it is going to be natural-gas-fired cogeneration. That is where the slack and the upward potential are to be found. There are significant potentials that could be developed from natural-gas-fired cogeneration.

Mrs. Grier: Can you quantify that?

Mr. Shalaby: We expect about 1,000 megawatts with incentives and maybe more. With more incentives, perhaps more than that can be developed.

Mr. Haggerty: Not at the buy-back of 3.5. You will never get them interested in it.

Mr. Shalaby: That is not a question.

Mr. McGuigan: Have we time for a question on natural gas? Down in southwestern Ontario, Union Gas has a policy of buying gas that an independent producer might have, especially in small quantities. Which would be best to the producer, to sell it at the natural gas rate--Union Gas pays 95 per cent of the cost from Alberta--or to turn it into hydro and sell it to Hydro? Which would be best from the standpoint of the seller?

Mr. Shalaby: At $4, emitting BTUs, they are probably better off to sell it as gas.

Mr. McGuigan: They are better to sell it as gas.

Mr. Shalaby: I think so. If gas goes down to two bucks, the situation would be different.

Mr. McGuigan: Your potential then for gas would be where the producer could not sell it to somebody else?

Mr. Ashe: That is where they are using it anyway.

Mr. Shalaby: That is happening in many places in the United States with what they call shut-in gas. They burn it and generate electricity.

Mr. Sargent: The California state government has spent about $46 million on cogeneration. The farmers are in trouble around here too, as you know. If we can cogenerate this cow-pie power, will Ontario Hydro play the same ball game as Consolidated Edison down there is doing?

Mr. McConnell: Yes.

Mr. Sargent: Okay, I will talk to you.

Mr. Shalaby: We would pay the avoided costs the same as other utilities.

Mr. McConnell: Protein biomass.

Mr. Sargent: Okay, we will get together then.

Mrs. Grier: You would pay avoided costs?

Mr. Shalaby: Yes, we would pay avoided costs.

Mr. McGuigan: It smells like money.

Mr. Chairman: Thank you, Mr. Shalaby.

I will now call on Mr. Penn.

Mr. Penn: My name is Bill Penn. Unlike others who have spoken to you so far, I am from the design part of Ontario Hydro's organization. My responsibilities as program manager of planning and engineering management are fairly diverse. I report to the director of the design and development division, generation. I have said my responsibilities are diverse; they involve fossil, hydraulic and nuclear generation. In the context of this meeting, my responsibilities are in the early planning of generation supply right up to the point of approval to construct, whether the plant be nuclear, fossil, alternative energy, hydraulic or whatever. I am also responsible for the preparation of the environmental assessment and its subsequent approval.

3:10 p.m.

I have two presentations to make, 6D and 6E. We have had to be very selective in choosing these because, as Mr. Marriage said, we looked at 90 or so generation options, involving coal, oil, gas, nuclear, hydraulic, stored energy and alternative energies, if you count different unit sizes. I would have to ask for several more days if I were to cover the costs of these, the engineering problems associated with them, the environmental matters and other issues that arise.

We have chosen to talk about Ontario Hydro's hydraulic development program which we consider important and which, as the chairman of our corporation mentioned, we are already studying in three cases. I was pleased that Mr. Haggerty raised some questions on wind. We have chosen to discuss that. I was also pleased that Mr. McGuigan asked yesterday about lead times, which significantly affect nuclear and coal. Perhaps in our discussions, we can tell you what we have been doing to shorten them to reduce costs.

I would like to start with the hydraulic development program and remind you that Ontario Hydro operates 68 hydraulic stations at the moment. We have a dependable peak output of something approaching 6,400 megawatts. The actual installed capacity is not much greater than that. We feel we have developed these hydraulic sites in an orderly fashion. What we are left with--and what I am going to discuss--in terms of the remaining potential is not quite as attractive but does have a lot of promise for the future. The reason I say this is that the 68 hydraulic stations we operate have a capacity factor of about 63 per cent. That means that of the rated capacity during the year, we are able to produce 63 per cent of it, whereas the capacity factor of the remaining potential capacity of interest is 26 per cent.

When I speak of the list of the remaining potential capacity, I am talking about rivers that have a potential of two megawatts' capacity or greater. In fact, the sites are very diverse and some are capable of several hundred megawatts of capacity. However, of the 9,300 megawatts scattered throughout our whole province, there are 1,085 megawatts that we are not in a position to develop since the Ministry of Natural Resources has classified them as waterway parks. A further 3,330 megawatts are associated with our northerly rivers flowing into James Bay and Hudson Bay, which are great distances from our existing transmission lines. Also, the land in that area is quite flat and environmental concerns therefore exist.

If we subtract from the 9,300 megawatts, we have a potential capacity of interest of 4,900 megawatts. That is associated with more than 100 sites. We did some studies of these potential sites between 1978 and 1984, in which we identified 17 sites that had a potential economic interest in the next 20 years or so. Those 17 sites involve 2,700 megawatts of this 4,900. Last summer we made recommendations to our board, which were accepted, that we should proceed with what we call a definition phase; that is, to do the engineering necessary to identify any practical problems, firm up the costs and proceed with the environmental assessments of these projects so we would be in a position to recommend approval or not. The three projects which I would like to discuss with you and let you know where we stand on them are Little Jackfish, the Mattagami River extensions and the Niagara redevelopment.

The 17 sites I have mentioned are scattered throughout our province. There is a predominance in the northeast, but there is also Niagara. We have Patten Post in central Ontario. Little Jackfish, with which I would like to start, the generating station of two units--132 megawatts in total--is located on Little Jackfish River, which flows into Lake Nipigon and subsequently into Lake Superior. The Mattagami complex, which involves three extensions of the existing units and a new station, is on the Mattagami River, which flows north into James Bay via the Moose River. The Niagara development, to take advantage of water that is being spilled and to take advantage of water from generating stations that have come to the end of their life, is associated with Niagara Falls.

On Litte Jackfish, I have a few general points. It will supply our west system. Involved in the project, if it is approved, will be the construction of access roads to that area, dams for the site, a power house and 180 kilometres of transmission lines, which likely will be on the east side of Lake Nipigon. There is a dependable peak capacity of about 129 megawatts. I mentioned that the total rated capacity would be about 132 megawatts. It has a capacity factor, we estimate, of 50 per cent. The studies that we are now involved in will take us over the next four years at a cost of $10 million in today's dollars and will involve selecting the transmission route, performing field studies for the environmental assessment and knowing the geology of the area to build the the power station.

The costs and impacts of Little Jackfish: At this time, we estimate the capital cost in 1985 dollars to be $440 million. The earliest in-service date, assuming we were to submit the environmental assessment to the Ministry of the Environment in 1988, would be, allowing for appropriate approval time, very late 1993.

The project itself provides an opportunity for supplying system power to the community of Armstrong and also improved road access in that area.

When we look at the environmental impact from our present studies, we do not see any significant environmental problems. We see an opportunity to install erosion protection on the lower banks of Little Jackfish, which are currently eroded. However, there will be a flooding of 2,400 hectares of land or about 6,000 acres. The land in question has no permanent residents but it does have a fly-in fishing camp which would have to be relocated. The construction activities would spread over four years and cause temporary environmental situations.

Let us move to the Mattagami River complex. It is located 80 kilometres north of Kapuskasing. It involves adding one unit of the same size as existing units to Little Long, Harmond and Kipling generating stations and the construction of a new plant at Smoky Falls.

At present, there is a generating station, privately owned by Spruce Falls Power and Paper Co. Ltd., which has an output of something just less than 60 megawatts and which was built by that company for its own purposes. We are undertaking negotiations with Spruce Falls for its water rights. The viability of this whole project is related to the success of those negotiations.

Our studies in the definition phase, getting ready for submitting the environmental assessment document, have started and will take place over the next four years at a cost of about $10 million and will involve the preliminary engineering of what is necessary at the four sites.

3:20 p.m.

The cost of this complex will be about $415 million. The earliest in-service date probably of the Smoky Falls plant will be October 1993, assuming that the enviromental assessment document is submitted in 1988. The other plants would be put into service during the following two years, ending May 1995.

With regard to environmental impact in that area, because we are not changing the river flows or levels very much as a result of this development, or redevelopment, we do not see any permanent environmental impact. Of course, again, construction will be taking place over a period of up to five years.

I would like now briefly to comment on Niagara. The proposed capacity of the future Niagara plant, if it is approved, is 550 megawatts. One third of that is really replacing generating plant already in place, so that in essence we are adding to the system about 398 megawatts or so. It would involve construction of an intake structure just above the falls where the present intake is situated, in addition to probably two underground tunnels from that position. These would pass under, through or over St. David's gorge and come out at a new power station in the location of Sir Adam Beck 1 and 2.

This project would also involve an upgrading of existing transmission lines. The studies we are doing at the moment and over the next two years are conceptual engineering studies as opposed to definition-phase studies. We are not starting with the environmental assessment at this point. We are trying to understand the nature of the engineering required, the design and how we would do it. We have to establish the plant layout, perform various model studies to design the intake system and identify the nature of the environmental concerns in that area. The earliest in-service date, assuming that we go into the definition phase in about two and a half years' time, would be December 1997.

Environmental impact from our present view of the project is that there would be construction activity on Ontario Hydro-owned property but adjacent to and within a populated tourist area. There is perhaps some concern, which we believe can be overcome, for the disposal of excavated material from the tunnels. We do not see, because we are not substantially changing the water flow over the falls, any aesthetic change in Niagara Falls themselves.

Mrs. Grier: Does it involve any change in our agreements with the United States as to how much water we take?

Mr. Penn: Not at this time.

Mrs. Grier: You are under capacity?

Mr. Penn: We are not using our full water rights at this time.

Mrs. Grier: Thank you.

Mr. Penn: Unless there are any further questions, I will quickly go through alternative energy.

Mr. McGuigan: I have a quick question. As I live on the the lake, I am very much involved with high water levels. Would it be at all possible to take your tunnel right up to Lake Erie?

Mr. Penn: I think that would be an extremely expensive undertaking but one that private enterprise would be pleased to do.

Mr. McGuigan: People on the lake are calling for a $1-billion expenditure at the end of the lake to take more water out, dredge or blast out the bottom of the Niagara River and put a control structure in so that you do not take too much water.

Mr. Penn: I understand there have been high water level problems in Lake Erie. I am not sure--perhaps Mr. Hill could help me--but I do not think this particular project could bear on that issue.

Mr. McGuigan: It could be worth while, though. If you took a look at the total cost of high water levels and integrate that with Hydro, you might be able to generate power and at the same time affect the levels on the lake.

Mr. Penn: That is certainly an issue that is not--

Mr. McGuigan: I am going right now. I have to meet a coalition, a group.

Mr. Penn: We certainly recognize the problem.

Mr. McGuigan: These people will have to spend $1 billion on controlling the lake down there. Maybe Hydro could do it.

Mr. Haggerty: Can I follow up with a supplementary?

Mr. Chairman: In a minute, when Mr. Penn has finished.

Mr. Penn: Thank you, Mr. Chairman.

Mr. Chairman: If we do not let him finish, we will never get done. Just hang on to it.

Mr. Penn: Alternative energy: We have been studying this for quite a number of years, and I would not want to leave the impression that the demand and supply options study has sparked Hydro's interest in these subjects. I think I shall be able to demonstrate that. We have taken as examples two renewable energy resources, wind and solar.

Solar photovoltaic cells: There are two ways one can gain energy from the sun. One can either do it directly by using mirrors or heliostats to concentrate the heat from the sun, raise steam in the normal traditional way and steam generate this; or one can do it by photovoltaic methods using silicone-type wafers, transistors that act as diodes. The sort of thing I am talking about is the calculator you might own that works because it is exposed to light.

The other thing I would like very briefly to touch on, because it was in your consultant's report for this hearing, is integrated coal gasification and combined cycle technology, which is one of two improved coal-fired fossil generation methods which have advantages with regard to restricting acid emissions.

I will start with wind. I do not think I need tell you that wind has been used to convert to mechanical energy, for example, grinding grain or pumping water, for centuries, particularly in Europe. It was used by farms in Ontario in the 1920s and 1930s because they did not have electrification at that time and did not have direct supply. With the service of the grid provided, many, in fact almost all, of these wind generators, which principally pumped water for farm animals, are no longer used.

There was renewed interest within the world and among many utilities in the 1970s due to the energy crisis. We have been in contact with utilities in the United States, particularly California, the Scottish electricity authority and Danish and Norwegian sources on the use of wind. It is a renewable resource of very high theoretical potential, but it depends upon the wind blowing, obviously, and preferably at a constant rate. I will say a few things about those practical aspects.

At the moment, we are installing a wind generator, which is 60 kilowatts in size, at Fort Severn, which is on the shores of Hudson Bay. Because of the remoteness of the site, not just because of the windmill and the generator, its cost is as high as $7,500 per kilowatt. Having studied the wind farms in California, which are extremely extensive and are approaching a capacity of 1,000 megawatts in various valleys, we know the average cost could well drop down to $1,500 per kilowatt in the long term, in 20 or 30 years' time in our area, but the standard cost even then would be high at $86 per megawatt hour. One of the problems with wind generators in the past has been the cost of keeping them reliably operating. It has been as high as two cents per kilowatt hour. There is evidence that it could reduce to one cent per kilowatt hour.

3:30 p.m.

However, as you will realize, the trouble with wind is that it does not blow constantly. Wind generator designers and manufacturers indicate you need a wind speed of six to six and a half metres per second for them to be viable in large use. Our average wind speed in Ontario, based on wind maps, is only five metres per second. It is very marginal, apart from remote communities. Today almost all of North America's installed wind capacity is in California--in fact, 99 per cent of it.

Mr. Sargent: Are they still adding more wind farms down there?

Mr. Penn: I cannot answer whether they are actively adding them, but they are close to 1,000 megawatts installed capacity.

Mr. Sargent: We had a farmer up our way who had two windmills. There was not enough wind to blow both of them, so he took one down.

Mr. Ashe: He had to be a Liberal.

Mr. Penn: It is crucial how you align them one to the other.

Ontario is not a windy place; the capacity factor is only in the 15 to 20 per cent range. At Pelee Island, which is a possibility, it would be about 17 per cent. They are not practical or cost-effective for the bulk electric system because the wind is so variable; it does not blow when you really need it.

Their land use can be enormous. This is not being facetious, but to replace the generating stations at Pickering, you would need a land area distributed over Ontario of six times the size of Metropolitan Toronto. We are talking about very large land use and unpredictable output. It is expensive and, believe it or not, there are environmental impacts. They can be noisy and bird mortality is a serious problem.

However, there is a possible use in remote communities in Ontario which cannot rely on diesel generators. That is one reason we are installing the plant at Fort Severn--to understand the interaction. Over the past five years, we have spent more than half a million dollars in wind technology, and we are continuing these types of programs.

I will cut short the remaining points.

A solar photovoltaic cell converts sunlight directly to DC current. Capital costs are very high. In fact, the whole concept was spurred by the National Aeronautics and Space Administration space program that required power for satellites when the cost was astronomic--in the hundreds of thousands of dollars a watt. Costs have come down, but standing costs are still of the order of $74 a megawatt. It is our prediction that perhaps this $8,000 per kilowatt might drop down to somewhere around $3,000 to $4,000 in the long term. The largest user and installer in Canada is our Canadian Coast Guard, which has about a thousand different units adding up to 100 kilowatts.

I would like to move to what we are doing in our province. There are lots of activities in Canada, such as windmills, but in Ontario we have a 2.4-kilowatt, stand-alone plant at Atikokan to supply power to an environmental station. We have a four-kilowatt, grid-connected site, which was installed in 1985, at Kortright, not too far from here, near Maple. We are going to have a 10-kilowatt photovoltaic system connected to a diesel generator at Big Trout Lake, which is in northern Ontario, about 300 kilometres south of Hudson Bay. Our ongoing development program is continuing. We will have spent about half a million dollars by the end of 1986.

Integrated coal gasification process: If you come from England, as I do, you know that in your childhood, and just after the war, gasometers were used. We converted coal to coal gas because we did not have natural gas. This process starts from that concept. You burn coal in a gasifier and you produce a synthetic gas which you then refine in a chemical process to remove the sulphur. You then burn that gas in a gas turbine, which is linked in turn through a combined cycle to a steam turbine. That is the process.

Since it is a collective process, one of its attributes is that you have no need to build the gasifier at the start. You could use oil or gas to drive the gas turbine and steam turbine and then add the front end later on; so it has flexibility. It has the possibility of phased construction. It is more attractive environmentally because it limits sulphur to a negligible amount.

The only demonstration plant in the world I am aware of, however, is operating in California. It is not yet competitive with conventional

coal-fired generation. It may well be in the future, but at a much larger size than 100 megawatts, probably in the order of 300 megawatts and ahead. Ontario Hydro is continuing to investigate this concept.

Mr. Haggerty: I have a supplementary to a question raised by many committee members about the agreement between the United States and Canada on the taking of water from the Niagara River. You indicated that the new plant you are talking about constructing on the Niagara River is still within Canada's or Ontario's share of the water.

Mr. Penn: That is correct.

Mr. Haggerty: Is this at the maximum capacity we can take off?

Mr. Penn: I think it gets close to that capacity.

Mr. Haggerty: How close is it? Oerhaps 300 megawatts?

Mr. Penn: Someone from system planning might be able to answer that. I do not have the answer.

Mr. Haggerty: My colleague Mr. McGuigan asked about lowering the water levels on Lake Erie. Another area Ontario Hydro should be looking at is making use of the existing Welland Canal, which now has a continuous flow of water from Lake Erie. I think there are two generating plants there now. Is one of them DeCew?

Mr. Penn: That is correct.

Mr. Haggerty: It generates about 300 megawatts?

Mr. Penn: It is of that order, yes.

Mr. Haggerty: To assist in lowering the Great Lakes, particularly Lake Erie, there is a possibility that you could use the water supply from the canal for about five months of the year, particularly in the peak period of energy use in Ontario. You could be setting up another 300 to 400 megawatts there.

Mr. Penn: I will certainly take that into consideration.

Mr. Haggerty: Take a good look at it.

Mrs. Grier: Could you talk some more about the integrated coal gasification? What you have said sounds good, but why has it not progressed any further, or has it progressed in other jurisdictions? What are the drawbacks?

Mr. Penn: The problem is that there is no known technology in the world to demonstrate its reliability. California is building a 100-megawatt demonstration plant. People they are encouraged because their electricity costs are three times higher than our costs. They have clean-air legislation and they do not wish to build further conventional fossil-coal or oil-generating stations.

Mrs. Grier: The incentive to develop would be the imposition of fairly strict acid gas emissions.

Mr. Penn: That is certainly one of the incentives. Fluidized bed is another reason. They are looking at fluidized bed coal-fired generating stations, which have much reduced acid emissions.

Mr. Chairman: Thank you, Mr. Penn.

Mr. Marriage, would you like to sum up?

3:40 p.m.

Mr. Marriage: I feel like a tail-end Charlie coming at the end, but I would like quickly to wrap up this series of presentations. I hope these brief presentations and the material we have tabled with you have helped to clarify our views on the options and their possible role in the development of the Ontario Hydro system. In concluding the presentations, I would like to highlight some selected supply issues on which your views are of interest to us.

In looking at these questions, I would like you to assume a supply is needed. The first four questions relate to relative weighting of some of the selected options in regard to long-term costs. Although this weighting is given in terms of cost premium, in looking at it, taking into account a number of the other evaluation criteria is appropriate.

1. Would you consider paying a cost premium to develop the renewable hydraulic generation in Ontario over coal or nuclear options and, if so, how much as a percentage increase in long-term costs? You will have to look at the environmental impacts, fuel supply, fuel cost and provincial economy impacts to determine the size of such a premium.

2. Would you pay a cost premium for the purchase of hydraulic energy from neighbouring systems over building our own hydraulic, coal or nuclear generation, and how much premium would you pay in terms of long-term costs? One of the important factors here will be the relative weight given to the Ontario economy in respect to employment and indirect economic benefits.

3. Would you pay a cost premium to purchase electricity from other sources within the province, including cogeneration, at a price exceeding Hydro's cost of providing that electricity at the time of purchase? If so, how much of a premium--this is a two-part question--if the fuel source used for the independent generation is renewable, such as wood waste or garbage, or whether it is a nonrenewable, gas or oil? In addressing this, you have to look at the impact of paying the long-term avoided costs which exceed our current avoided costs. This results in higher electricity rates and energy bills for nonparticipating customers in the short term, again relating back to the customer equity we talked about on the demand side.

Mr. Sargent: In every equation, you leave out the safety factor. It is totally negative.

Mr. Marriage: I am saying that all these have to be assessed against all the various evaluation factors. Safety was one of them. I am highlighting some of them. As I said at the beginning, you have to look at all the evaluation factors in finally determining the premium.

4. Would you pay a cost premium for the development of small alternative generation technologies we have just been hearing about to limit the expansion

of centralized stations and bulk transmission and how much, comparing that with the coal and nuclear options? Here again there is a question of equity that has to be considered between the developers who receive the incentives and benefit from it as opposed to the rest of the nonparticipating customers, who will end up with the higher electricity rates and energy bills.

Finally, construction of large hydraulic, coal and nuclear stations takes five to eight years, following another five to eight years for the design and approval. This results in lead times of 10 to 16 years from drawing-board to full production. We feel this is unacceptable. Both the increase in planning flexibility and the ability to reduce costs to our customers, including yourselves, can be achieved by shortening both the construction and approval times. We are looking at ways right now of doing both of those. We are interested in your views with regard to ways to shorten the approval time. Again, these questions are by no means the only feedback we are looking for from you but reflect both the scope and breadth of issues on which we are interested in your views.

I conclude by saying the panel is now available to answer your questions and to receive your input on the options and the issues.

Mr. Chairman: Might I suggest that we have about 25 minutes for questions and then we will move in to part 7 of the presentation? Who wishes to go first?

Mr. Charlton: I will attempt to be brief.

Mr. Chairman: I am going to divide the time equally among the three parties.

Mr. Charlton: I have a couple of questions I would like to run through to clarify for myself how you view and assess some of the options that we went through this afternoon. I do not want to get into a discussion, and I want this understood, of whether photovoltaic is viable in 1986. One of the comments you made in the presentation was that photovoltaic required large areas of land. I presume that implied there would be substantial costs involved, even in the future when the costs of the technology came down, for huge tracts of land for installations. Is that necessary as a requirement when you are looking at that kind of technology since we have literally hundreds of thousands of acres of land under buildings in this province?

I will throw an example at you of which I am aware. In Bermuda they have done a fairly extensive amount of installation, not of solar photovoltaic, but solar for water heating. It is all done on homes and they do it in what I think is a very orderly and managed way. They have bylaws that say the solar installations go on the back of the house; they do not, for example, go on the street side. Why is the land a requirement when you are looking at something like photovoltaic?

Mr. Penn: If you generate it per square centimetre of of cell, it is very small; it is fractions of a watt. It is just that the power density is extremely small per unit area. As far as costs are concerned, it would appear that as volume increases because more people are interested in the concept and it has more applications, particularly in remote communities for example, then costs naturally fall, as we discussed this morning. That is the major area for reducing costs.

Mr. McConnell: Mr. Charlton, you asked if the required land area could be reduced. What Bill is saying is there is a tremendous amount of energy coming from the sun and falling on Ontario but the amount of energy per square foot or square metre of area is very small. Yes, you could think of covering your house with photovoltaic cells. Still, that is the amount of land area you would need. We cannot change that elementary fact of nature.

What Bill has described is what is called terrestrial photovoltaic, although he did not mention the expression. If you were thinking of 50 or 100 years from now, it is possible that technology might advance to the point where we would not have to use all that land and we could go to outer space, collect the energy and then zip it down in a small area, but that is a long way off.

3:50 p.m.

Mr. Charlton: I understand what you are saying. I was not thinking of Brian Charlton running out and individually trying to install photovoltaics on his roof but rather at the utility of looking at those places in the province where major installations by the utility some time in the future would be least offensive.

We have had major debates for years in this province about loss of farm land and that kind of things. You do not want to be sticking huge photovoltaic facilities in the far north that are supposed to be supplying power down here. When you get to the stage of looking at something such as that, what is wrong in a conceptual way with looking at installing it where it is going to be least offensive and least costly, which is on existing structures? Hundreds of thousands of acres of land are under buildings.

Mr. Marriage: We have not ruled out that option because of the land requirement. All we are pointing out in trying to go through some of the pros and cons is that both wind and solar take a large land area to produce any significant quantity of megawatts. Ruling out that option right now are the high costs of developing wind and solar generation as we know them today.

Mr. Charlton: How much of that high cost is the land you would have to purchase if you were going to install it on your own land?

Mr. Shalaby: The cost of land is not a significant part of the cost of photovoltaic.

Mr. Charlton: That is what I wanted to know.

Mr. Shalaby: It is not. In California, it is $100 or $200 an acre, for example, and it may not be very much different here for land that is not prime land. The point about land is not a cost-related one.

Let me come back to your question about covering all the land that is built over. I did a calculation at one time of what would happen if we covered most of the rooftops in Ontario with photovoltaic cells. I made crude assumptions about how much of that would be facing in the right direction, and so on. I found you can generate up to five per cent of the electricity used in Ontario. Even if you cover wall to wall all the roofs that are available in the province, you are looking at about five per cent of the electricity consumption. There is still an upper limit.

Mr. Charlton: The technology is going to have to improve severalfold before it becomes any kind of a viable option.

Mr. Shalaby: Yes.

Mr. McConnell: Mr. Shalaby has indicated that land would not be a high cost. It is fair to say that it was not included in these costs. In reality, if you were going to occupy, say, an area six times the size of Metropolitan Toronto, then for this province that would become a consideration that was not included in these costs.

Mr. Penn: There is one thing I failed to mention about both wind and solar photovoltaic. You also have to have a storage system if you want to make use of the energy either when the wind is not blowing or at night. That is an additional problem.

Mrs. Grier: May I ask a supplementary on that? In your evaluation of both these options, you seem to be thinking in terms of large-scale installations. Does it make any difference to your conclusions if you make the assumption that both wind and solar are going to be used on a smaller scale and in many different individual applications?

Mr. Penn: The whole thrust of our program is to look at small specific uses, such as in remote communities.

Mr. McConnell: Yes. That does not preclude the option you are talking about, Mrs. Grier, if you were thinking of a decentralized power supply system for Ontario.

Mrs. Grier: I am thinking in personal terms of a cottage I have. It probably involved a a capital cost of $10,000 for you to bring power in to us. Would it not have been cheaper to have advised me to put in a wind or a solar installation, neither of which ever crossed your mind or my mind when I asked for the power?

Mr. McConnell: If you are talking about a remote location, you could consider either of those options for a cottage. Off the top of my head, a small wind generator, if you were serious about it, probably would be more attractive in your case today.

Mrs. Grier: The cumulative effect of a lot of small applications such as that must have some significant financial impact.

Mr. Penn: Nevertheless, remember the capacity factor is very low.

Mr. McConnell: Yes. You would have to install a storage system.

Mr. Penn: A supplementary system.

Mr. Charlton: You mention storage, which brings me to my second question. I am asking these questions because I do not know the technical answers. When we were talking about storage in the presentation, you talked about battery storage and its lack of viability because of the short life of batteries. The reference you used was car batteries. What types of battery technologies do you look at when you do those studies?

For example--and again, I do not know the technical possibilities--a company in British Columbia has developed a lithium battery which it claims will last for ever. I just saw a promotional film that was done on it a couple of months ago. It has to be recharged about every eight years in the applications for which the company is using it. Have you looked at those things which are happening in the area of new technologies for storage?

Mr. Penn: Yes, we have. I am very surprised to hear your comment about lifetime use from a lithium battery because that is not my knowledge.

Mr. Charlton: The factory is just being built. The battery is not on the market. That is what is being claimed in this promotional film I saw.

Mr. Penn: People have been searching for improved storage via batteries for many years and the prospect does not look promising.

Mr. McConnell: If technology should yield something such as what you are describing, it would be a--

Mr. Charlton: We have heard commercial claims made before that were not true, and I do not know whether this one is true. The company is just about to go into production, as I understand it. It is the type of thing that piques your interest when you hear it.

Mr. McConnell: Electric automobiles are extremely attractive from the point of view of environmental impact, operating them and so on. On the other hand, the storage battery that can provide the long range just does not exist yet. There is still a tremendous amount of research going on.

Mr. Ashe: They have not made the cords long enough.

Mr. Sargent: If you will forgive me, Mr. Chairman, I would like to ask someone on the panel whether Ontario Hydro is an international participant in the Institute of Nuclear Power Organizations.

Mr. McConnell: Yes.

Mr. Sargent: You have full access to all its safety and technology?

Mr. McConnell: Yes.

Mr. Sargent: Every day when you pick up the paper, you see headlines about leaks, spills and things such as Three Mile Island. Are you not concerned about the slackness of the Atomic Energy Control Board or the Atomic Energy of Canada Ltd.? Are they doing their job, or what the hell is wrong?

There was a story in the Toronto Star about June Rowlands, who is raising hell in Toronto council that the records show that AECB does not keep tabs all the time. There is a history of benign neglect. It is easy for us to sit here and and throw darts at you guys; you have a hell of a big job. A lot of people in Ontario are against nuclear power and against Darlington.

I hope that by some strange quirk of fate we will be able to turn that around and stop Darlington. I know the climate is not right for that. You keep on equating everything on accepting that nuclear power is safe. Only an insane person would believe that today. There are scores of textbooks that say we are in the age of terrorists who could walk in--I do not know what security you have around the plants--and God knows what could happen.

4 p.m.

We had the case of the operator at Douglas Point who blew the whistle on you guys. That guy was a first operator, he lost his job, his family broke up, and now he is settled in the north country. You know how he told the whole story of how Three Mile Island could happen quite easily here. I am concerned about what AECL and AECB are doing and about our association with INPO and the Nuclear Regulatory Commission in the United States. Collectively, we should have some way of keeping a cap on this stuff. I know you are aware it can happen. We have proved it can happen.

I am not going to make a speech, but I want to say I always thought if there were an earthquake in this country, we could have two million people in Toronto at risk. They tell me that, seismically, your new plant is being built so an earthquake would not uncover the water of the spent fuel rods. Is that happening in this new plant, so that an earthquake cannot upset the swimming pools?

Mr. McConnell: The design takes into account the seismic effects that are applicable to Ontario, yes.

Mr. Sargent: I apologize to the committee. I must be a pain in the ass; I am always talking about this. I have lived with this stuff all my life up in Douglas Point, and we are in trouble--maybe not now, but down the line something is bound to happen.

Mr. Penn: I would like to make one small comment. We do not have time to answer all your concerns today, but I was manager at the nuclear studies and safety department for nearly five years. I was the manager responsible for licensing our nuclear plants. I can assure you the Atomic Energy Control Board is a very onerous regulator to deal with. With the amount of analysis we have done, the record shows no fatalities and no concern among operators, to my knowledge, in our history of producing electricity.

Mr. Sargent: I am sorry, I disagree with you on that.

Mr. Chairman: Can we agree to disagree and go to Mr. Ashe?

Mr. Sargent: I want to say in closing that INPO has about 400 employees down there, and I think if anything such as what is happening in Ontario with the leaks and the headlines we are having all the time were happening in the United States, all hell would break loose. Why do you not put a cap on what is happening here and find out what is going on?

Mr. McConnell: With the large number of components in a power plant, just as with your automobile, there is no question that we have component failures, leaks and so on, as you have described. Certainly, they have to be taken into account in the design and the operation, and they are. The bottom line is that the reliability of our nuclear plants exceeds that of other types of power plants in North America. It is better.

Mr. Sargent: Why are you not selling more of the Candu then?

Mr. McConnell: With regard to public safety, we are very proud of the track record we have achieved on hydraulic, and I do not want to be seen as criticizing hydraulic. However, there is no question about it. The performance of our nuclear stations has been better than that of hydraulic, and we expect that will continue in the future. That is in terms of demonstrated performance.

With respect to the cost, we have an extraordinary performance. The costs for our nuclear power are the lowest in the world and considerably lower than--

Mr. Sargent: It is going to cost you $1 billion to mothball a plant.

Mr. McConnell: The costs you mentioned earlier, those associated with taking the plant out of service at the end of its useful life, are included in our standard costs that were presented this afternoon.

Mr. Ashe: It is really difficult to know what to get into. Unfortunately, Mr. Sargent is not going to like this, but that is too bad. I too have a rather public person in my constituency who is involved in local council and is always putting out great gloom-and-doom predictions and so on. Real estate values show it from time to time, unfortunately.

Is there any way Hydro--and it is probably not best if Hydro per se does it because it would be twisted by some people--or is there an organization, whether it is the one Mr. Sargent referred to or some overall industrial organization, that could from time to time put out public consumption, in a very public way, the comparisons of safety in related industries?

For example, we all know that regardless of the industry, if there is a lot of man-made equipment, there are leaks and breakdowns. They are expected from the day you put on the first button. I know somebody will say, "Well, it is not like nuclear." In fact, if you are talking about other kinds of gas and oil production, chemical production or anything along those lines, it is just as damaging to human beings and/or the environment.

Is there any body or organization, whether it is co-ordinated through a federal government agency or whatever, that could put out these things to put everything in context? I guess the analogy is with the airplane. When an airplane crashes, as happened in Mexico a day or so ago, the headline is always that 160 people were killed. In actual fact, there are a lot fewer people killed flying in airplanes than there are driving in automobiles, if you compare the numbers, the miles and whatever. One gets the headlines; one does not. It is grossly unfair. Is there anything that can be done in that regard or is there any agency that can feasibly do it?

Mr. McConnell: I think it is a very good question. Without getting involved in a lengthy discussion, it is desirable that such evaluations that compare risk be done by parties other than those who are participating. In other words, we in Ontario Hydro make such risk comparisons and we make the data available for people to scrutinize. It is to our advantage if other organizations that are seen as being more neutral or not having a vested interest look at it and do this sort of thing.

Last year we had a review that involved this subject by the Canadian Council of Churches, to which we and our critics presented information. That is an example of an attempt. We would welcome universities initiating on their own such a comparison so that we would not be seen as tainting them, if you wish, or influencing their evaluations.

Such evaluations have been done, but I would not suggest to you that it is simple. Whoever does the evaluations, unless they have the capability to do them very objectively, are accused of going about it the wrong way. Universities in the United States have done this; it has been done in England

and it certainly would be to our advantage. Even governments are accused of bias when such evaluations are done.

Mr. Ashe: There is no doubt in my mind, but I think it would be helpful to the average John Q. Public or average John Q. Taxpayer, when he hears and reads these gloom-and-doom type of predictions, that everything has a risk. I do not think anybody disputes that. It is relative risk that has to be put into some perspective. There is risk when you get out of bed in the morning.

Mr. McConnell: Just to be specific, Mr. Ham, the former president of the University of Toronto, indicated a year ago that he was thinking of doing such an evaluation. I think it would be to Canada's credit if he did such an evaluation. He indicated he is thinking about comparing mining, forestry work, transportation, different forms of energy and so on. It certainly is a good thought you have.

4:10 p.m.

Mr. Ashe: I think that would be helpful.

I think we also have--and frankly I guess I am as guilty as anybody else in this regard--the perception that our safest method is hydroelectric generation. With the water flowing, you build a little dam and you harness the energy.

I am sure all members saw yesterday's Globe and Mail, which referred to one of the greatest engineering feats in the world known as Hydro-Québec at James Bay. It looks so safe and big, but its looks as if they have created the worst mercury pollution in the world. It is even making Grassy Narrows look like a piece of cake. It is acknowledged in this, and it is the first time I have heard of it; so I cannot comment on how accurate it is. It is the creation of these large, dammed-up areas and vegetation degeneration that has caused--as I read it in a nontechnical way--the contamination of many water areas for the Cree Indian bands in northern Quebec. On the surface, it may sound as if it is pure water, but as some would say, it may be water out of the Don River.

I have one last item, which I think is very important for the future of this province. Frankly, as we get into the post-Darlington period, the future perceptions of Ontario Hydro are these other technologies. Some have a lot of appeal but are somewhat pie-in-the-sky as compared to being realistic. The options have to be put out.

You are asking us for our opinion on the actual cost options. We are a pretty small group and we are all very subjective on this, probably not very objective. It is the type of thing that has to be put out. In some way, the public has to know the premium it is willing to pay. It is willing to pay it, it knows it up front and that is fair ball, but I also think there has to be a time when the government of the day, whatever government that may be, gives the direction to go other than the most effective cost route.

Mr. Chairman: I have one very quick supplementary question to Mr. Ashe's point. I am going to come back to this because you asked us to discuss it. It is on question 4, the premium for development of alternative generation technologies versus coal or nuclear. I assume you put the question up there because you had some sense that there may be a lack of public acceptance of coal and nuclear generation. Do you have anything with which to substantiate that?

Mr. Marriage: It was not put up for that reason. As we have shown, a lot of these technologies, as we see the costs today, are coming out higher in terms of the standard costing of coal and nuclear.

Mr. Chairman: Is it a straight cost comparison you are looking at?

Mr. Marriage: It is for those who want to develop small sources as opposed to large sources, and a distributed system as opposed to a centralized system. We are asking how much of a premium you are prepared to pay for a distributed system versus a centralized generating system. It is not that we were concerned about the coal and nuclear option.

Mr. Chairman: But that does not really deal with my question of public acceptance.

Mr. Marriage: That is one of the factors. As I said, we have listed about eight or nine evaluation factors in presentation 4D. When doing this type of weighting and coming up with a premium, you would have to consider all the other evaluation factors as well.

Mr. Chairman: All right.

Mrs. Grier: To follow up on that, as I understand these questions, they are totally related to dollars. You have not added in the societal value or anything else.

Mr. Marriage: As I said, you can express the question and the result of the question in a dollar premium but you have to consider the other evaluation factors as appropriate.

Mrs. Grier: I have one quick question of Mr. Meehan about the purchase option. While looking at the unfavourable characteristics and a couple of other times in your presentation, you made the point that if you had a 30-year contract, you would have nothing to show for it at the end of 30 years. You would not have a plant that you had built, so that would be the end of it. Surely in planning any major facility, you are looking at a lifetime for that facility. Would not the purchase option have the same characteristics as a plant that had a 30-year or 40-year lifetime and then have to have greater funds invested in it if it was going to be carried on any longer?

Mr. Meehan: That is entirely true if you are talking about a generating station that would live 30 years and a purchase that would live 30 years.

Mrs. Grier: So the length of your contract would also presumably be reflected in the negotiations and price that you negotiate?

Mr. Meehan: That is true.

Mr. McConnell: Yes, and if it was a purchase for 15 years versus a plant for 30 years, for example, you would have to take that into account.

Mrs. Grier: There is nothing to say you could not have an option to renew that agreement at the end of whatever the time of the first agreement.

Mr. Meehan: You could have such options. That is part of the discussion process.

Ontario Hydro is approaching this question the way you, I think, would like to approach it, that is, to argue for a long time. Both Hydro Quebec and Manitoba would take the other stance. They would like it to be a shorter period. I do not know right now what will ultimately be traded off in these negotiations.

Mr. Haggerty: Have you considered in negotiations with either Manitoba or Quebec that Ontario Hydro invest in the plant facilities itself? Would you not secure your investment that way and perhaps get a greater return? You would then be sharing some of the profits.

Mr. Meehan: That question has been brought up and more or less set aside in both cases because we are not at the point of dealing with these kinds of details. Right now we are trying to assess whether there are sufficient economic or other benefits in the idea to proceed with it. We have not thrown out the idea of investing.

At the same time, 10, 15, 20 or 40 years down the road, long before the hydraulic dam would be at the end of its life, both these other provincial utilities would like to take over the entire output of the station. Even though we may have put capital into it, I am not sure the other provincial utilities would presume we would have it for the entire lifespan. That is a possibility.

Mr. Haggerty: Could you not buy 20 years of it?

Mr. Meehan: Yes.

Mr. Haggerty: You could then option to get it leased back to you on a purchase through that area.

Mr. Meehan: All those things are possible.

Mr. McConnell: Mr. Chairman, we did not answer your second question. You asked us, independently of our asking the select committee those questions of premiums, "Are we trying to get some feel of how the public of Ontario feels?" That falls into two categories.

We have industrial organizations that are trying to make this province go forward. They are concerned about whether we pay an extra price by not taking the least-cost route. Of course, we have the question of people in residential homes and so on and how they feel about paying a premium. I want to indicate we are conducting such opinion surveys. We will have that as part of our information before we make our recommendations next fall.

Mr. Chairman: My concern is not so much with the premium in cost; it is more in terms of general public opinion. Have you done any surveys to sense the pulse of the public on issues such as nuclear and coal generation?

Mr. McConnell: The answer is yes. That will be part of our report this fall.

Mr. Chairman: Mr. Gordon has one quick question and then we are going to move on.

Mr. Gordon: Before we move on to the next part of this presentation, this committee has been talking a great deal about people and how conservation

impacts upon the public of Ontario. We have been talking about various forms of generation and so forth. I see Mr. Campbell is still here. I noticed in your presentation yesterday you spoke about how, in your blending of the costs of fuel, the utility is studying whether these savings on a larger scale outweigh the social consequences of cancelling one of its Ontario contracts and probably closing down much of Elliot Lake.

4:20 p.m.

We have been looking at this whole issue of supply and demand and Darlington on a macroscale, but there is a microscale here and one that should concern this committee. I do not think we can deny this committee is going to have an impact on what happens at Elliot Lake in the future. It has happened already in that the Ontario cabinet has seen fit to say that nonessential construction can wait. That is as a result of our deliberations. We saw the mayor of Elliot Lake come down here and express his views. We hear Tom talking about the possible weighing of social and societal obligations vis-à-vis Elliot Lake and trying to weigh that versus how much you are going to pay for uranium from Saskatchewan and so forth.

How do you go about determining the social consequences of cancelling contracts in the Elliot Lake area? That is one question. Second, what is Ontario Hydro prepared to say about those social consequences when it comes to the further development of places such as Darlington and/or the development of the uranium that comes out of Elliot Lake?

Mr. Campbell: We believe, and I think we have the data to indicate, putting aside the question of Elliot Lake and uranium supplies, that the Darlington station is needed on schedule to meet the needs of the people of Ontario for low-cost, reliable power. Obviously, we think that should be the primary consideration. If you did not need the plant, it would be hard to argue that you should build it anyway because you had contracts at Elliot Lake. We think that should stand on its own and we believe it does. It is a sound proposition. It is the lowest-cost option that we have of any of the options within that time frame. Not only that, it will be needed.

As I mentioned yesterday, our industrial customers are telling us they are concerned, even with that, that we may be facing a shortage of power. In other words, we may be underestimating our power requirements. We have to take that seriously. I think the select committee on energy is going to be hearing from some of those industrial customers--Amoco Canada Petroleum Co. Ltd. and there is a joint committee of heavy industry and so forth--that are are going to make a brief to your committee. That is one question.

Assuming we have so much uranium required to run those plants, the problem we have at Elliot Lake is that when those contracts were signed many years ago, the growth of power use in Ontario was much higher because it was before the oil embargoes hit and the world economy went sideways. The main problem there is the volumes of uranium contracted for in the long term are higher than we now require even with Darlington. If Darlington were cancelled, it would make that problem that much worse. I agree with that.

One of the things we would like to do is balance our supply with demand, obviously, in the interests of our customers and of the cost. However, if we were a privately owned utility, a theoretical one with shareholders who really did not care about the consequences and just wanted profit, then I think we would perhaps have one point of view, which would be to buy uranium at the

cheapest place we could get it. As a crown utility, we have been here a long time--80 years. We plan to be here a long time. We have to be socially responsible in this province. We think we should be prepared to pay a premium for an indigenous resource from Ontario to keep communities like Elliot Lake going.

There is a price to be paid for that and it is like the questions in front of you here. There is a balance there. How much more are you prepared to pay? It is not the fault of the miners of Elliot Lake. They are as efficient as miners anywhere else and good workers. It is just that ore has been discovered in Saskatchewan and it is much cheaper. The price is about one third of the price you can mine it for in Elliot Lake. You have to face the fact that to have a viable industry in Elliot Lake, you are going to have to pay a higher price.

Right now we are balancing that. We buy approximately one third from Saskatchewan and one third from each of the two mines in Elliot Lake. The Saskatchewan uranium is lower in price, so that brings the average price down a bit and gives our customers a certain amount of a break.

Our objective is to negotiate some kind of resolution that would go somewhat towards meeting all our needs and balancing our supply with demand. Obviously, we cannot continue to buy uranium we do not need. I do not think that even the people in Elliot Lake would expect that over a long period of time. Luckily, that is not a serious problem right now, but that problem would continue if those contracts went unchanged and would get quite serious in the 1990s. Right now supply and demand are not too far out of balance. We think we have some time to bring them into balance.

Second, we would like to find a solution that would keep those industries viable in Ontario, for several reasons. Social responsibility is an important one, but we would be reluctant to say, even with low-cost uranium from Saskatchewan, "We are going to get all our uranium from Saskatchewan." Even the Japanese, who presumably do not care about where they get it, make sure they balance their sources so that they are not dependent upon one source of supply.

It is interesting. We keep about an eight months' supply of uranium in stock, while the Japanese and the French keep a three years' supply. They are much more concerned. There is a cost to that, and that is a saving we have. Because Elliot Lake is close, we think we do not need a large stockpile. That is an advantage to using an indigenous source that the Japanese and the French do not have. The Japanese are continuing their long-term contracts with suppliers, such as Elliot Lake, even though they could buy uranium on the spot market at a lower price, because they are concerned about security in the long term. They plan to be around a long time as well.

We have to take the long view. We have to look at the social consequences for the workers and the community there and balance those with our needs. We hope we can come up with some solution that will address all those considerations in some reasonable measure. It is going to be tough. We are in negotiation right now and, within a period of time that is not too far away, we hope to come up with something. It will not be perfect. There will have to be some give and take in any situation such as that, but we hope we can act responsibly in that area.

Mr. Gordon: I have a question that relates to remarks made yesterday concerning contract negotiations and so forth, and I know the people of Elliot Lake are very concerned. The committee has been asked by the mayor of Elliot Lake and the chamber of commerce to tour Elliot Lake. The chairman made it clear that at the present moment, with the kind of time frame the committee has, we cannot fit in such a visit before the Legislature comes back. If the committee cannot go before the Legislature comes back, would members agree to set some time aside if the mayor and the chamber decide they want to come down here and have another kick at the cat before we finish, prior to April 22? Could we hear them?

Mrs. Grier: Is this at all part of what we are looking at in this phase of the committee?

4:30 p.m.

Mr. Chairman: That was my concern. I noted the mayor's request some time ago. I had a long discussion with him regarding his request and pointed out that the terms of reference of the committee were such that we were compelled to report by the end of May and that we had chosen, as a steering committee, to deal with the supply and demand options question prior to making the final recommendation on Darlington.

I said at the time that if the committee had a life beyond the end of May, which would require the Legislature to give it that life, I was sure members of the committee would find it very interesting to spend some time in Elliot Lake, perhaps in the summer when the committee might sit, and to hear from them then. I assumed that was a reasonable and satisfactory answer to the mayor. I felt that was the last of the issue with which we had to deal.

Mr. Sargent: I missed that. Did you personally make a commitment?

Mr. Chairman: I could not make a commitment, Mr. Sargent.

Mr. Sargent: I was not criticizing.

Mr. Chairman: I do not know whether the committee will have a life beyond the end of May. I made a commitment that we would not go during this sitting. The mayor suggested he would like to table his submission. I said we would be glad to receive it and gave him the clerk's name.

Mr. Sargent: May I say something here? I appreciate Jim's concern about the people. We are talking about people. I also have great faith in Tom Campbell, who is a square shooter. I think he could come up with an answer. I know the issue is people, but we are talking about a contract. I do not think it would be productive for us to go there. It would be counter-productive. I will leave it that way.

Mr. Gordon: I am not looking at it from the point of view that we should go in and try to negotiate a contract. That is not part of our mandate at all, but we are talking about supply and demand. I have been sitting on this committee now for a number of weeks, in the past, today and yesterday, and I have heard people talking about conservation. They have talked in quite noble terms about what should or should not be done when it comes to nuclear power or hydro in this province.

Here we have a community--a one-industry town--that can be affected in a big way by what happens with what Hydro is able to work out. It is also affected by what is said in this committee by various members. If those people are concerned about the kind of news stories they are hearing right now and the kinds of utterances they are hearing from those whom they feel are power people in this province, we have an obligation to give them the opportunity to come down here and have another kick at the cat in the light that some of us might like to put forward a minority report with regard to the kinds of impacts decisions make on people, whether we have or do not have nuclear, wind power or new fluorescent bulbs. If we do not have the time to hear those people, I think we are backward and have it all wrong.

Mrs. Grier: Are you suggesting we hear everybody whose livelihoods might be affected?

Mr. Gordon: I am suggesting you hear these people from Elliot Lake. You are talking about a major community in the north, a one-industry town. These people are miners. You are talking about people who have put down roots in that community, who have been through boom and bust before. They are frightened right now. They have a right to come here and be heard. It is not a lot to ask.

Mr. Charlton: To date, it would seem the committee has done nothing that will affect Elliot Lake. You are right in that there is the potential this committee may decide to do something that would affect Hydro and its relationship with the contracts in Elliot Lake. So far, all you have seen in the press are statements by the chairman of Ontario Hydro about negotiations it is doing on its own and the impact of a decision by this committee if it should make that decision.

We should not be making motions here during presentations. Because we do not know if we are going to have a life beyond the end of May, the compromise is that, if the committee considers recommendations that will clearly have an impact on Elliot Lake, we should fight for at least a sitting day to hear a delegation from there.

Mr. Gordon: We have to agree, do we not, Mr. Charlton, that our deliberations here will impact on Hydro?

Mrs. Grier: I hope so.

Mr. Gordon: You hope so.

Mrs. Grier: Otherwise, why am I here?

Mr. Gordon: Exactly. If they are going to impact on Hydro, they are going to impact on Elliot Lake.

Mrs. Grier: And a lot of other places.

Mr. Gordon: Not in the same way. This is a one-industry town that produces the uranium that goes into nuclear plants to produce electricity.

Mr. Charlton: The compromise I was suggesting is very simply--

Mr. Gordon: They should have the opportunity of coming down here before we are finished.

Mr. Charlton: --a compromise to deal with the current report that we are going to be making. I have suggested that if we are considering recommendations in that report that will directly affect Elliot Lake then, as a committee, we should fight for an extra day to sit down and hear them before we finalize those recommendations. As a committee, we will be able to make that judgement. If we are not going to have any recommendations in this report now that affect Elliot Lake and we end up with a life beyond the end of May, then we can consider hearing them anyway.

Mr. Chairman: Before I hear from Mr. Sargent, I have to make the point that Mrs. Grier raised. There are many other communities as well that are going to be affected by this committee's deliberations. If we are going to hear from Elliot Lake, and I respect its concerns and the fact that it is a one-industry town, are we prepared to hear from Oshawa, Bowmanville and all these other communities which might be impacted as well? I only put that point out on the table.

At the same time, I assume Mr. Charlton is proposing that we seek a day to sit prior to the end of May to hear from the Elliot Lake delegation.

Mr. Charlton: That is right.

Mr. Chairman: You are not suggesting--

Mr. Charlton: If, and only if, in our judgement, it affects the recommendations we are considering--in other words, if we end up seriously considering the recommendation that units 3 and 4 be cancelled. We have not come to that stage yet and we do not know that yet. At that point we should try to get that day to hear the people from Elliot Lake. As the chairman has said, that is a recommendation that would have a very direct impact.

Mrs. Grier: What about Ajax and--

Mr. Haggerty: I think that is the problem with--

Mrs. Grier: You cannot restrict it.

Mr. Chairman: Quite frankly, I have little problem with that.

Mr. Haggerty: Hydro was talking about selling that and that would be a problem.

Mr. Sargent: That is right. My point was that Hydro is pumping in $1,000 a house into Port Elgin to get rid of the houses up there. At least, that is the rumour around the country. I do not know whether it is true or not. They are hurting pretty bad in Port Elgin and Kincardine. If they see Elliot Lake down here, they will be on my tail, as well as that of the member for Huron-Bruce (Mr. Elston).

Interjections.

Mr. Sargent: Yes. I am not against it.

Mr. Gordon: Why should they not come?

Mr. Sargent: Hell, that is not our problem. It is a contract that was signed a long time ago. It was not a good contract and the chairman of Hydro is handling it. Let us leave it that way.

Mr. Gordon: They live in Ontario too.

Mrs. Grier: We ought perhaps to decide that we want to look at the contracts and ask permission to examine the contracts in some depth as the next phase of this committee and then hear from all those affected by them.

Mr. Chairman: We can have a fairly extensive discussion on this issue, but we have before us an esteemed panel which now wishes to make a further presentation. In light of the time, let me suggest that that we defer further discussion on this issue. I do not have tomorrow's agenda in front of me, but I would like to say that we have half an hour's discussion on this issue tomorrow. Can we get on with the presentation.

Mrs. Grier:Can we defer it to the steering committee?

Mr. Haggerty: May I ask one question?

Interjections: Tomorrow.

Mr. Haggerty: It is a direct question. Tomorrow, no. That was just asked yesterday.

Mr. Chairman: Who is your question to?

Mr. Haggerty: It is in regard to the purchase of hydro from Manitoba. I want to know what effect it would have on the Atikokan plant and the thermal plants in Thunder Bay?

4:40 p.m.

Mr. Chairman: Could we have Mr. Meehan back for about 10 seconds? Put your question then, Mr. Haggerty.

Mr. Haggerty: In your proposal, there was the purchase of hydro energy from Manitoba. What effect would that have on the thermal plants in the Atikokan and Thunder Bay areas? If you were to purchase that, would you be closing down some of the facilities in that area? We are going to get back to the same question of one-industry towns.

Mr. Meehan: I whispered to Mr. Marriage, "What about Atikokan?" when you were talking about Elliot Lake. There should be no effect on Atikokan or Thunder Bay operations. The power and energy that we would be buying would be for the total system as opposed to just for the west system. This ties in with the fact that we would need the east-west tie, from Thunder Bay to near Thessalon. Once that tie goes in, which it would with a large purchase, we become one system, so to speak, and that alone should not affect the operation of Atikokan.

Mr. Haggerty: In other words, you can wipe out the North Shore generation plant for sure now?

Mr. Meehan: I cannot say that. That might remain as an option.

Mr. O'Connor: Mr. Chairman, ladies and gentlemen, my name is John O'Connor, and I am director of public relations for Ontario Hydro. I am here today to talk to you about the public consultation and public communications program that we have undertaken on behalf of working with the demand and supply options study.

Just before getting into it, I have to commend the members of this committee for their level of endurance and capacity for information at this time. I hope it continues for at least another 15 or 20 minutes.

I would like to stress the fact that we are talking about public communications and public consultation. We are not--at least I was not intending today--talking about the ongoing consultation process that we have with government and the policy direction we receive on the initiatives we take.

In the next few minutes, I will try to talk about the objectives of these programs, the people who are participating, the three main program areas and the highlights of each of the programs. I believe you have received a copy of the submission, and this presentation is more or less based on that.

In setting up the consultation and communications programs, we have tried to meet the needs and expectations of the Ontario community. We have recognized for some time now our responsibilities to inform and consult with communities affected by Ontario Hydro's plans and activities. These programs will help to ensure that the demand and supply options study plans will meet our customers' needs for electricity and will reflect future needs, values and expectations that they have.

All the consultation and communication programs at this stage have three overall objectives: to inform the people of the province of the need to plan and the range of options that are available for meeting future energy needs; to obtain the views of a wide cross-section of the people on the options and the planning process; and to provide guidance on the public issues to planners and decision makers within Ontario Hydro, including the social responsibility committee of the board. Each program that I will talk about today has specific objectives within that range.

We wanted to involve as wide a cross-section of people as possible. If we were not constrained by time or resources, it would be nice to talk to everybody. We have to try to look at how best to get the widest cross-section of input, and we have identified five general groups we hope will do that.

There are provincial organizations which represent special interests across this province. There are community leaders who are active in community and public affairs within their local communities and across Ontario in general. There are our residential, commercial and industrial customers, municipal utility commissioners and managers who help distribute the electricity system, and the general public which has an interest in Hydro.

The three program areas we have chosen are: the communications programs, that is, essentially getting information out on what we are trying to do; customer surveys, which are intended to try to get information on what our customers think; and consultation programs, with a two-way flow of information.

I will make remarks about these program areas and highlight a few details of each. I will talk about the communications side first, move into the customer survey side and then spend a little more time on the consultation programs.

In terms of communications, these programs are designed to interest, inform and involve people in Hydro's planning activities. It is often difficult to get people interested in planning for generation 15 or 20 years down the road, or in demand-side options that are several years down the road, when they are worried about what they are going to do tomorrow or the next day.

We have chosen Meeting Future Energy Needs as a title, because demand and supply options is not something that captures a lot of public attention. We have tried to choose a title that reflects what the study is doing and has a more interesting message.

The key messages are that it is time to plan now, that Hydro is looking at all the options, both supply and demand, and that public participation is sought in the planning process.

In terms of communications activities, last year the chairman started a major presentation on the demand and supply options study that was picked up by a number of senior executives throughout the year. There have been numerous presentations through Hydro's speakers' bureau. Many people in the room today have participated in meeting local community needs for information.

We distributed a 16-page brochure called Energy for the Future. I am sure many of you have seen that brochure, and there are a number of others available if you would like to have extra copies.

The 1985 annual report has as its theme the demand and supply options study. Unfortunately, that will not be available until about May. An eight-minute video called Beyond 2000 has been put together. Committee members may see it if they wish.

There are numerous in-house publications to keep our employees informed of what we are doing, because they are an important audience to us as well. We have developed a cable television program called Watts Up. One of the sections of that program concerns the demand and supply options study, including numerous media announcements and responses to media.

The last major initiative in terms of communications was a teaching aid developed by a committee of educators to help the education community understand the process we follow in this demand and supply options study.

The customer survey process helps us obtain reliable information. If we cannot talk to everybody, at least we get a representative sample of a broad section of our customers. A major survey is being done by Goldfarb Consultants. That study is expected about the end of April. We have some early oral information about what it might say.

We will be doing a survey of visitors to Hydro information centres. That program has not started yet, but it will start this summer. Visitors will see the videotape and then be asked to fill out a questionnaire.

Our survey involved talking to 1,200 residential customers. These were not telephone calls, but in-house, face-to-face visits. We also surveyed 200 commercial customers and 200 industrial customers. Some of the topics of the survey included the role of energy and electricity in Ontario; customers' plans and expectations for energy use; and the acceptability of demand options, such as price changes and strategic conservation. Because of the involvement of customers in demand management, we asked a lot of detailed questions about what they thought in that area--the acceptability of supply options, the role of Ontario Hydro in those options and values they have in decision-making on energy. I have already indicated that the results will be in this spring, around the end of April.

We wanted to raise the awareness of participants in the public consultation process programs concerning the need for planning and the options and to seek their views on policy issues. We were not looking for consensus--and I stress that--but rather a cross-section of viewpoints. The focus of the consultation was on concerns, priorities and values, the basic public issues concerning demand and supply options. The focus was not on the technical aspects of the study.

4:50 p.m.

We have used the face-to-face discussions approach to facilitate two-way communications in the consultation program. Within the broad consultation program, there were actually three what might be called subprograms. We talked with provincial organizations that represent the special interests here in Ontario; we have a regional consultation program that moves about the province to collect the views of regional interests; and we have a municipal utility consultation program that discusses it with utility commissioners and managers.

In terms of the provincial organization consultation part, we tried to get views of special interests here in Ontario. We invited about 125 organizations to participate; 58 organizations indicated they would be interested and did participate in the consultation program. They included industry, resources, agriculture, commerce, local community, environment, energy and religious interests.

Hydro participants in this portion of the program included the chairman of the corporation, a board member--John Erickson, the chairman of our social responsibility committee--senior executives in Hydro and all the planning staff associated with this study.

Brent Snell and Larry Moore, who was working with Brent, attended many of the meetings as observers on behalf of the committee.

As I indicated, the program focuses on policy matters--priorities and values--rather than technical aspects. We held five meetings in Toronto, and discussions covered the supply options, demand options and general planning issues. In the discussions, we had short presentations followed by small group discussions with Hydro representatives. Each small group selected its own chairman and recording secretary, and the points raised were brought back to the main group at the end of the session.

To provide some background, we gave the participants the system planning report, Meeting Future Energy Needs: An Initial Review of the Options. We asked the organizations that participated in this part of the program to submit briefs addressing six questions as well as any other relevant materials they felt were important. Those questions will be covered by Ken Snelson in the second half of this presentation.

So far, we have had 24 briefs submitted. A number of groups have also submitted briefs to this committee. For resource reasons, some had to make a choice of which committee they were going to respond to.

A summary report is being prepared, including documentation of the process, all the minutes and all the briefs. The report will be presented to the planning staff to help them in their decision-making. It will be presented to senior management of Ontario Hydro--the senior management of Ontario Hydro participated and heard directly--and the social responsibility committee of the board. As I mentioned, the chairman of that committee was present at a number of the meetings.

We will be sending a response to each organization and submitting a brief. All the material is available to anyone who is interested. We intend to maintain our contact with the interested participants in this part of the program and, as you heard in Mr. McConnell's presentation, there is another consultation process planned later in the study process.

The regional consultation program has been planned for people active in affairs in their communities. We invite about 30 people to each meeting from a cross-section of interests in a local community. We have had business people, local politicians, teachers, environmentalists and many others.

Hydro representatives have included the chairman, most of the senior executives, all the regional directors and the planning staff associated with this study. So far, eight meetings have been held and at least nine more are planned. Some of the places have included Hamilton, Sudbury and Port Hope. I can provide a more detailed list if that is required.

Many of the meetings are cosponsored with a local organization such as a unversity, with a neutral moderator. At the meetings, a short presentation is given by Hydro, followed by a showing of the videotape and a discussion. We send follow-up questionnaires to all participants. A summary report will be prepared, documenting the results of all the meetings.

The municipal utility consultation program, which is the third part of the overall consultation program, has been developed for, in a sense, our customers and the people who serve the majority of electrical customers in Ontario. Again, the Hydro participates are senior executives, regional directors and staff. We are holding meetings in each of Hydro's six regions. The overhead says we have had three meetings and six more are planned. We have actually now had five meetings and four more are planned.

Also, an informal liaison committee has been put together with representatives from the Municipal Electric Association, which is the new association formed from the Ontario Municipal Electric Association and the Association of Municipal Electrical Utilities of Ontario. The Hydro representatives are three vice-presidents, who will get that association well acquainted with what Hydro is doing and will receive their input.

In summary, we have developed what I think is a wide variety of programs and activities to reach and listen to the public through the communication programs, customer surveys and consultation programs. We have tried to cast a wide net to gather public views on all the options. Many people have been involved with many different points of view. We have asked at least 1,600 customers their interests through a survey. By the time we have finished this stage, we will have discussed the demand and supply options study with more than 700 people in the consultation process.

Many of these people, in turn, represent interests of hundreds or thousands of others, and many thousands more have heard the speeches, seen the video or read our printed materials. The results of these programs will be an important component to the supply and demand options study. Our activities in consultation and communications will continue over the coming years.

If the committee wants, Mr. Chairman, I am prepared quickly to show the eight-minute videotape, but if in the interest of time you have other things, that is up to you.

Mr. Sargent: He did not hear you.

Mr. O'Connor: Mr. Chairman, do you want the tape or do you want to hold it?

Mr. Chairman: We will hold the tape for a moment and we will go on to Mr. Snelson, please.

Mrs. Grier: Is your survey of 1,000 customers a randomly selected scientific sample?

Mr. O'Connor: Twelve hundred?

Mrs. Grier: Yes.

Mr. O'Connor: Yes, it is.

Mr. Snelson: My name is Ken Snelson, in case you have forgotten. I am assistant to the director of system planning. Up to a year ago, I was the section head in the bulk electicity system, resources planning department of the supply and demand planning section.

I have kept my presentation very short. I have three slides where I used to have nine, and I am trying to finish by five o'clock. We will do our best.

Mr. Ashe: You have two and a quarter minutes.

Mr. Chairman: You have been around this committee too long.

Mr. Snelson: In the presentations you heard previously on the supply and demand options, we mentioned public issues in the context of specific options. I would like to summarize the issues discussed in the consultation programs.

The information we expect to obtain from the consultation programs is qualitative, dealing with values, preferences and tradeoffs. The surveys will provide quantitative data, but here too much of the information is on values and preferences.

Integrating this information with technical and economic information is important, but it is not an easy task. The information will be used as we assess the major issues and in identifying the important tradeoffs that are necessary in any plan. We think it is useful to think of public issues in terms of questions.

In the consultation program with provincial organizations, we posed six key questions. We asked the groups to address these questions in their briefs. They are:

1. What considerations or criteria are important in energy planning?

2. How should tradeoffs be made?

3. What should Hydro's role be in serving or encouraging economic development in Ontario?

4. How should Hydro be involved in how our customers use electricity? This question reflects on the demand options.

5. What direction should Hydro take in the next 15 to 20 years?

6. What are the needs for information and consultation?

5 p.m.

These questions or something similar were the focus of the other consultation programs too, and they are also very similar to the questions Mr. Marriage put to this committee at the end of the supply and the demand options presentations. I had intended to expand on each of those questions, but in the interest of brevity, I have cut that. Therefore, we will move on to how we will use the results of the consultation.

There are two paths to including the results of the consultation programs in the planning process. The first path is directly to the social responsibility committee of the board of directors. Summaries of the results in all briefs will be presented to the social responsibility committee and this will ensure that all opinions are taken into account by the board.

The second path is upward through the planning process. Planning staff and senior executives have participated in all meetings with the public. I have been to all the public interest group meetings and quite a number of the regional meetings and other planning staff have been to the rest.

We will be using this information as we formulate alternative strategies. We will also use it in the analysis of alternatives to the criteria of cost, environmental, economic and other impacts. Therefore, the results will be an important part of the proposals which we as planning staff put up through our line management and which will eventually end up at the board.

The questions we have asked the public and their responses are an important part of the planning process. They are essentially the same questions we have raised with this committee, and your responses will be essential to the planning process. That is the very brief and quick presentation; I missed it by nearly a minute.

Mr. Ashe: No, it was more than two minutes.

Mrs. Grier: I am sorry to come to this one at the end because, obviously, you have hit on the nub of much of the whole thing. I would like you to comment briefly on the different roles, if there are different roles, to be played by the utility and by government in answering the public issues you have raised. You are asking the questions that need to be asked and that are imposing, if you will, the societal values in the Hydro portion of the planning process. Is that appropriate or is that the sole locus of that kind of discussion? If that kind of discussion occurs at the utility level, where does the government's role fit in?

Mr. Snelson: First, it is important for a utility to be aware of what its customers and the public feel is important. That is part of the main focus of what our consultation is about. I am sure it is also important that governments and legislatures listen to the public. All the results of our consultation process will be available to this committee, in public documents to the government and in any other consultation processes that we will have. I do not think I can answer what the role of government should be. I know it is important for Ontario Hydro to be listening to its customers; that is a very important function.

Mrs. Grier: Therefore, you do not feel that the role that is being played here need be the exclusive purview of Hydro? You see that same kind of role being played by others in the policy-making process?

Mr. Snelson: I believe government has to be listening to the public too.

Mrs. Grier: Are we talking about the same public?

Mr. Ashe: Nearly everybody is a consumer or a taxpayer.

Mr. Haggerty: You were talking about consumers?

Mr. Snelson: We are consulting with our customers directly. We are also consulting with representatives of the public. You can talk about them as two distinct entities, but there is a very large degree of overlap between them. Most members of the public are either directly or indirectly customers of Ontario Hydro.

Mr. Charlton: I have a couple of quick questions. I think it is good this public process you are going through is happening. But why is it happening at this particular point in the process? Why not earlier in the process? For example, you have already been through the evaluation of all the options before you heard from the public.

Mr. Snelson: I think I can answer that one. We are going through the process very early in the planning process. We could have waited until all preliminary studies and the more final studies of phase 2 were completed before we went out and discussed things. When you go out to discuss things, it is very important and useful to have a base of information to put before people so that they have a basis for forming opinions. The purpose of documenting the phase 1 results in public documents was to provide that basis for public discussion.

That is a very early stage in the process and it comes before any proposals have been formulated inside Ontario Hydro. One of the reasons for moving back the date of the completion of the study was to allow time for Hydro to take in that input from the public consultation process. It allowed time for the input to be digested, the responses to be prepared, the summaries to be put to the board of directors and so on, so that the public input could influence the tentative proposals we will be making towards the end of this year. That is a very early stage in the process to be getting public input.

I am not saying: "Hydro has been away and studied everything. We know the answers. Here they are. Tell us whether you agree with us or not." We are saying, "We have done some preliminary studies and this is the rough information on which they are based." Normally, we would not like to go out with such preliminary information. We would like to complete studies before we do that and have hard, firm results. A lot of questions remain to be answered, but we have gone out early in the process with preliminary information. Four final recommendations have been formulated, so that the consultation process can be undertaken and have an effect on the recommendations we will make.

Mr. O'Connor: You have to have something to consult with. You cannot go with a blank sheet of paper. I might add that this is not new to Hydro. We have been involved in the public consultation process for at least the past 10 years. It is an ongoing exercise in this corporation.

Mr. Chairman: Mr. McConnell, we are in your hands.

Mr. Ashe: Is there no drum roll for the finale?

Mr. McConnell: I would like to conclude our presentations with a brief overview of the issues. We raised some of the issues yesterday and today, but there were also a number of issues raised by this committee that we would like to address. At this early stage in the planning process, Ontario Hydro is seeking input to help resolve a number of public issues related to the demand and supply options study. We have not adopted a firm position on any of these issues. They remain questions.

This committee's views on these issues will be valuable in the process of developing our recommendations. At the end of this year when phase 2 is expected to be completed, we should be in a position to discuss tentative proposals for our demand and supply decision-making framework. At this stage, we propose another round of public and government consultations that will focus on specific proposals.

5:10 p.m.

Should the mandate of the select committee be changed or extended, Ontario Hydro would appreciate a further opportunity to review such recommendations.

I had planned to go over and recap quickly the Ontario Hydro issues we have tabled with you, but in the interests of time, I am going to assume that you remember all those and I am going to jump over those. I would like to address the issues put forward in Mr. Andrewes's letter to our chairman on March 12.

Let us first talk about some of the demand issues about which the select committee asked us.

The first question was, "Is there merit in pursuing demand-side programs while Ontario has a reserve margin of over 35 per cent?" Our response is that in our presentation 4C by Art Hill we discussed the need for both demand and supply options. We pointed out that our economic reserve today is already close to the desired reserve of about 25 per cent and we indicated what our power situation was this past winter. Our simple answer is yes.

Our other presentations on demand management have shown that it is important to have a sustained effort to achieve a significant effect and that market research, program design, demonstration programs and so on are necessary and take time. It is not too soon to start implementing new demand management activities now so that they will be fully effective in reducing the need for generating capacity in the mid- to late 1990s. Demand programs aimed at improving provincial prosperity by encouraging new economic uses are particularly appropriate at this time, if at any time.

The second question you asked us is, "How can Ontario Hydro build a reputation in demand-side practices and technologies comparable to its worldwide reputation with supply-side programs?"

First, we thank the staff for their gracious remarks on supply.

Mrs. Grier: It was the chairman's assertion.

Mr. McConnell: I hasten to add that we are in business to serve our customers rather than to build reputations. However, we are proud of the reputation we have established worldwide and we are already providing world leadership on demand-side options.

Let me give you some examples. Ontario Hydro has considerable experience on the demand side, as explained by Hedley Palmer in presentation 5C. We have a leading load factor. I do not know whether the information Mr. Palmer gave to you in quantitative terms fully registered or not, but our load factor, which reflects demand management activities, is one of the highest in the world.

Mr. Ashe: Sixty-eight per cent.

Mr. McConnell: The Electric Power Research Institute of the United States places many contracts with us and regards us as a leading utility in demand management. I believe that some of the staff were down talking to EPRI. I would be extremely surprised if any person who visited EPRI did not hear major favourable comments made about Ontario Hydro. It turned out that I was visiting them not too many days after that. I was not going in an Ontario Hydro role; I was going in my role with the North American Electric Reliability Council.

Ontario Hydro planners are in key roles in both North American organizations such as NERC and world organizations such as CIGRE and play lead positions with regard to demand management.

Let us now consider supply questions raised by the select committee.

The first one was, "How can prohibitive lead times be shortened?"

Long lead times do concern us. The acquisition of major hydraulic, nuclear and coal stations can be done in five to eight years. We are studying ways to shorten the construction time further. However, before we can even start construction, we require another five to eight years to get the approvals. We are also studying this issue. Recommendations can be implemented only with government co-operation. We welcome your ideas and suggestions on this, although we are and will be studying this issue further and will be recommending ideas to the government.

The fourth question is, "What are the pros and cons of major power purchases?"

We discussed purchases from Manitoba and Quebec in our presentation this afternoon. In addition, we are interested in your views on the economic, environmental and social implications of major purchases. We shall be putting our recommendations forward in a later stage of the study. Your comments will be most valuable. Specifically, we favour hydraulic generation because it is a renewable resource. However, we are concerned about loss of employment in Ontario, loss of planning flexibility and possible higher costs to our customers.

Question 5 was, "Is independent power production good for Ontario? If so, how can it be promoted?"

Our response to this is yes to some independent production and no to some other production. Renewable energy with low environmental impact is good

if it is not too expensive. The use of long-term, scarce resources such as gas and oil to produce electricity is questionable even with the high efficiency that cogeneration offers, particularly if a premium is paid. Nevertheless, Ontario Hydro is willing to buy all independent generation at a fair price. We are doing further studies to determine a fair price. Independent power production can be promoted with a fair purchase price, and perhaps incentives.

Your question 6, which has do with evaluation of options, is, "How should the demand-side options be integrated with supply-side options in the planning process?"

Ontario Hydro's demand and supply options study is a fully integrated process. In our presentations 3 and 4, we described the evaluation criteria and their integration.

Your question 7 is, "How should social values, that is, non-economic criteria, be factored into the selection process?"

Our response is that some societal costs, such as customer damage costs, customer demand-management implementation and provisions to meet environmental requirements, are evaluated in dollar terms. However, not all societal costs, such as land use and employment, can be evaluated in dollar terms. Whenever practical, we develop quantitative measures to aid decision-making.

Ontario Hydro has a social responsibility committee that is part of the board of directors. Ontario Hydro recommendations consider minimum cost, public views and other factors. Last, all major decisions are approved by the government. For the government to make such approvals, we forward the economic criteria as well as those factors that involve societal judgement.

The eighth question, which has do with the decision-making process, is, "Are there barriers preventing the government and Ontario Hydro from pursuing the best options in Ontario?"

Our current response is yes, there are barriers that slow us down or which, in some instances, may prevent us from implementing options. However, we are used to such challenges. We must work with the government, other bodies and the public to minimize the impact of these barriers. We have identified specific barriers in our series 5 presentations, which we presented this morning.

Your question 9, also related to the decision-making process, is, "Who should decide between the tradeoffs and how?"

<u>5:20 p.m.</u>

Our response is that Ontario Hydro proposes plans and programs that take into account government policy, public input and internal studies. These proposals are reviewed by a number of public bodies, such as the consolidated hearings board, the Environmental Assessment Board, the Ontario Energy Board, the Atomic Energy Control Board, royal commissions, select committees and the provincial government.

If we are to streamline the approval process to maintain customer reliability and minimize customer cost, we should be asking ourselves, are we overdoing the tradeoffs, not making decisions promptly, paralyzing Ontario and causing unemployment? That is the reverse side of the question. How do we do

the balancing? The other question is, are we already overbalancing and slowing ourselves down in this province? The government independently establishes and implements programs which influence energy demand, including electrical demand.

Your question 10 was, "Is there an adequate forum for building public consensus on electric planning issues?" Our response is that the present structural processes in place to seek input and understanding are adequate, but we also believe they can be improved in application. However, in a society with many diverse opinions held by individuals and groups of people, a consensus on supply and demand issues will not always be achievable.

We have made presentations to you on the public consultation programs we have for the demand and supply options setting in the presentation you have just heard. We welcome suggestions on how these processes could be improved. When consensus is not achieved, the elected representatives in government must decide whether Ontario Hydro's recommendations are acceptable or must provide further policy direction.

Question 11 was, "Is there sufficient evidence to indicate that there are enough cost-effective, demand-side options to alter the economic justification of all or part of the Darlington nuclear generating station?" Our answer is no. We have presented evidence that additional supply is required, assuming all of Darlington is built, expected demand options are implemented and the requirement for electricity reliability is met at lowest cost. This was presented to the select committee in the fall of 1985 and the situation has not changed.

There was one further issue that we perceived as a result of the presentations of the select committee. This was not a specific question that was put to us in Mr. Andrewes's letter. It had to do with the question the consultants raised to the select committee in their report called, Choosing Demand and Supply Options, which described the utility's perspective as being distinctly different from the societal perspective; that was in their exhibit 8.7.

Our response to that is that Ontario Hydro is a public utility and strongly objects to the suggestion that our perspective is different from the societal perspective. Ontario Hydro's goal, which we follow to the best of our ability is to meet the requirements of the Ontario community for electric service, including the manner of its provision, so as to result in the greatest overall benefit to that community and in the lowest cost to the customer for that service over the long term.

In our emission statements, presented to you last fall by Milan Nastich, we emphasized two objectives: customer satisfaction and provincial prosperity. In our presentations, we acknowledged that tradeoffs are required in some instances. For example, we discussed the equity issue for demand options and asked for your views.

In conclusion, we have dealt with all the issues requested by the select committee. If given more time, we could have provided more information. During this hearing, we will be listening to the views of this select committee and the other witnesses. We are prepared to appear before you at any time during the remainder of this hearing to further discuss these and other issues that may arise.

That completes my presentation. Thank you.

Mr. Chairman: Thank you, Mr. McConnell. I thank you for a very concise summary in response to those questions.

Mr. Charlton: Perhaps you can stay here so we can throw up some of those slides that relate to my questions.

Mr. McConnell: We have the paper here to distribute, which may be more helpful to you.

Mr. Charlton: First, I wanted to deal with our question 6. In your response to that, you have said the demand and supply options study is fully integrated. We heard from Hydro staff this morning that the data available on the demand-side options are weak and seriously lacking. How can you be saying on the one hand that the study is fully integrated and on the other that you do not have all the data you need?

Mr. McConnell: The specific question you asked us was, how should the demand-side options be integrated with supply-side options in the planning process? The response was that we do have a fully integrated process. That still leaves room for the fact we are in a changing world and we are seeking more information.

The process is fully integrated. We indicated to you this morning that, to evaluate the specific options further, we feel we need more data. That is still consistent with having a process that is integrated.

Mr. Charlton: Is there not a difference between having a process that is fully integrated, to the extent to which you can integrate it at present, and ending up with a study that is fully integrated? What we are talking about here is a demand and supply options study, which is supposedly going to come out at the other end with a fully integrated, balanced view.

Mr. McConnell: We live in a changing world. The information base is dynamic. I described that to you yesterday. We are in a continuously changing technology; we have to be updating that data all the time.

Also, when we indicated to you this morning that we need more data, in terms of the demand side, we do not feel we can be doing everything on everything all the time. To be effective in utilizing our dollars, we have to identify specific sectors of our business and specific end-use applications to see where our effort will provide the best options. Those then produce so many megawatt dollars per megawatt hour as the best opportunities. In the process we described to you, we will compare those with the other options and make the best choice. It is integrated in that respect.

Mr. Charlton: I do not disagree with you at all that Hydro is no different to anybody else. Everybody cannot be doing everything all the time. Again, the way this demand and supply options study was presented to us, it was the biggest and most extensive study you have ever done. If it is to be fully integrated in what comes out the other end, in other words, if we have a full view of all the real options at the end of this study--

5:30 p.m.

Mr. McConnell: Perhaps the problem lies in your interpretation of what you perceive to be a fully integrated process and the definition I have in mind. Basically, when you get into a fully integrated process in the

context in which we interpreted your question, we have load forecasts, supply options and demand options. The process we are considering is a fully closed loop. In fact, we change our load forecasts, based upon our valuation and implementation of the demand options. Claudette MacKay-Lassonde attempted to describe to you that there are closed loops among the forecasting, the demand options, the supply options and the implementation.

Mr. Charlton: This morning I asked specifically whether we have the data we need to fully evaluate a number of the alternatives being put to this committee. The answer was no. I also asked whether we have the data we need in the demand and supply options study to fully evaluate the potential between now and the year 2000 for demand-side alternatives. The answer again was no.

Mr. McConnell: That is correct. We indicated to you that we have a desire to improve our data base in order to improve our demand management. If you ask us the same question five years from now or 15 years from now, we will never get to the point where it is 100 per cent. The data base will always be maintained, but at the moment we have a need for a step improvement in that particular base.

Mr. Charlton: Will that happen during the course of the completion of this demand and supply options study?

Mr. McConnell: Obtaining that data and establishing that data base will undoubtedly be improved at the end of this year when we come forward with our recommendations or our tentative proposals. However, it will not be completed that rapidly by any stretch of the imagination. It is a very challenging task in a very changing society.

Mr. Charlton: You may then be in a position of having to make major changes at the conclusion of that study.

Mr. McConnell: No. It will not destroy our conclusions because we still have expectations that we will implement and reap benefits from the demand-side options during the time horizon of this period.

Mr. Charlton: Can we move to question 9. When you were commenting on question 9 and giving the response, you threw in a word that is not on the slide or the printed sheet. You said Ontario Hydro proposes programs and plans taking into account government policy.

Mr. McConnell: Correct.

Mr. Charlton: That goes back to something else I raised this morning. I want to put it on the record again so you truly understand what I was getting at. It is fine for Hydro to propose programs and plans that conform to government policy but it is also important that Hydro provide the government and committees such as this one with information on what else is possible and what the ramifications of those other things are.

Mr. McConnell: We indicated that we agree with that point of view. We want to respond and provide data that may be requested by the government or this organization.

Mr. Charlton: My last question relates to question 11. We asked whether there is sufficient evidence to indicate there are enough cost-effective, demand-side options to alter the economic justification for

all or part of the Darlington nuclear generating station. I understand your answer to that question, but I do not understand why it was put in such absolute terms, given what we have just discussed with regard to the demand side and the need for data that do not exist now.

Mr. McConnell: You had asked us a question and we were trying to give you a definitive answer. We said our answer to this question was no. That is our judgement based upon the evidence we have provided to you. That does not necessarily mean our judgement is infallible. That is up to you to judge.

Mr. Campbell: However, I think it is fair to say we believe the interim report of the committee was based on an inaccurate assessment of the data we presented. The conclusions reached looked at the low side of growth and arrived at conclusions that, for example, there would be surplus power at Darlington in the year 2000. However, you looked at only one side of the equation. I think you had inadequate analysis. I am not complaining about--

Mr. Charlton: In the interim report, we said what I have said now. There was a lot of data that was unavailable andis still unavailable on this day in 1986.

Mr. Campbell: The implications of the report ignored the range of data that is already available.

Mr. Charlton: No. It did not ignore the range of data that was already available.

Mr. Campbell: We can give you an analysis of that.

Mr. Charlton: If we had ignored the data that were available, we may have talked about cancellation instead of, "Let us get the data that do not exist, or let us attempt to see whether we can get them." That is what the interim recommendation said, even though myself and my colleague did not happen to agree with it.

Mr. Campbell: It is sufficiently important because this is a serious matter. As they say, this is not a rehearsal for your life; this is your life. This is serious stuff and it requires serious consideration. We should give the members of the committee an assessment of where we think the analysis was inadequate, not factually correct and not based on the facts. That is a concern to me.

Mr. Charlton: We would be happy to have that from you if you want to present it. The only point I am making is that this committee was very careful in its deliberations. We understand that recommendation 3 of the interim report had no serious impact on Darlington at all. The recommendation said that you should not let any contracts that were not required for continuing construction, so you can go ahead and let your contracts and continue with your construction. We already knew from you that all the long-term orders were already in.

Mr. Campbell: I was not referring to that particular recommendation.

Mr. Charlton: All right. The committee was very careful in what it did. My colleague and I happen to have dissented from that. I am talking about this because you are referring to the committee's report. The committee was very careful in its deliberation. It was also aware that there was a substantial amount of data that we could not evaluate in terms of answering for ourselves the questions about Darlington.

Mr. Haggerty: Mr. Chairman, on a point of order: It is getting late here.

Mr. Chairman: The report he is referring to is the briefing document.

Mr. Charlton: No. I was talking about the interim report.

Mr. Campbell: We were talking about the interim report basically, but some matters in the briefing document concerned us as well.

Mr. Charlton: That is another issue, but you did refer--

Mr. Campbell: It is serious enough that the committee would want to have the information, if we believe the factual analysis is not correct.

Mr. Charlton: Most certainly.

Mr. Haggerty: Mr. Chairman, on a point of order: The day is getting late. It has been long going through all the facts presented to the committee in the past couple of days. I think page 33 puts it in context. It says:

"In conclusion, we have dealt with all the issues requested by the select committee. If given more time, we could have provided more information. During this hearing, we will be listening to the views of this select committee and the other witnesses. We are prepared to appear before you at any time during the remainder of this hearing to discuss these and other issues that might arise."

I think that leaves a door open. If we are not satisfied with the information here, Ontario Hydro will be called back and will give the additional information the committee requires.

Mrs. Grier: I have a question that goes back to our original question about the integration of the demand-side options and the supply-side options. Mr. McConnell's answer was that the process allowed for that integration to occur, but admitted that perhaps Hydro did not have all the data that might be desirable to fully do the demand side.

5:40 p.m.

Did the resources devoted to the collection of the data on the demand side equal those devoted to the collection of the supply-side data? If not, what can be done to balance those two in order for a full integration to occur?

Mr. McConnell: We communicated to you a forecast of what we felt would be the needs of our customers. We gave you a forecast last fall and we gave you a forecast this time of what we felt we could achieve through demand management. We also reviewed with you the experience we have had in the demand-management field that had to do with the kind of yields that we have achieved in the past.

Even if we had this large data base right now, we would still be faced with the practical question of making a forecast of what kind of penetration and what kind of response and acceptance we got from our public. We would still be forecasting the amount we felt we would achieve. I do not think that the large data base, if it sat here this afternoon, would change our forecast by very much because we still would have the practical problem of implementing new programs in addition to those we have now.

We gave you a number of examples where we said we had to learn by doing, so we got these pilot programs and demonstration programs. They would still have to be implemented. We would have to find out from experience. We very carefully identified that there is a major uncertainty in the achievement that will come out of that demand-management program. That adds to the uncertainty we had identified in terms of what our customers will be requesting.

In terms of our ability to implement and evaluate the supply-side options, we have a pretty good handle on that. In other words, a large amount of uncertainty is not associated with the delivery of the supply-side options. We do not have to go out to the public to get that information.

Mrs. Grier: There are still uncertainties about some of the alternative technologies and you are still doing pilot things in that area. I am wondering whether the budgetary allocation and the personnel devoted to the exploration of that side of the ledger equal the resources applied to the explorations on the other side of the ledger.

Mr. McConnell: We do not really have people who are doing a lot of work on evaluating the supply-side uncertainty. We have a pretty good handle on that right now. We did indicate to you that we were going to put some further effort into finding ways and means of shortening it. We addressed that question. However, the number of people involved in the demand-side options at the present time exceeds the number we have on the supply-side options because we do not really have a major question in terms of the supply-side options. We have people working on supply-side technology, as distinct from evaluating the data base.

Mrs. Grier: Would you not regard implementation of demand-side options as being the same thing as technology on the supply side?

Mr. McConnell: That is fair enough. As we indicated this morning, in the process of getting a handle on the public, we have communicated to you these various activities we have going on in terms of getting public opinion and evaluation through our area offices that are in touch with the public. That is a very complicated process. Undoubtedly, as we proceed with the demand program, there will be further people deployed in these particular areas, but the process of getting this data base you are asking about is something that cannot be done instantly because it involves going through surveys and so on and going out into the public arena and finding out. We do have a major effort we are planning in that particular area.

Mr. Chairman: Are there any other members of the committee who have questions?

Mr. Haggerty: There are not too many of us left.

Mr. Chairman: Thank you very much, all of you, for your last two days. I hope you found us reasonably attentive and reasonably patient. Thank you for a very thorough presentation. I thank Mr. McConnell particularly for the last part of it, which I found very helpful in addressing a number of the issues that we were really looking to get to.

Mr. McConnell: Thank you very much, Mr. Chairman.

The committee adjourned at 5:45 p.m.

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

FRIDAY, APRIL 4, 1986

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitutions:
Cordiano, J. (Downsview L) for Mr. McGuigan
Leluk, N. G. (York West PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Forsyth, S.
Assistant to the Clerk: Vita-Finzi, M.

Staff:
Moore, L., Adviser, Electricity Section, Policy and Planning Division, Ministry of Energy
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

From Ashley-Robinson Management Services Inc.:
Robinson, D. J., President

Individual Presentations:
Robinson, Dr. J. B., Associate Professor, Department of Man-Environment Studies, University of Waterloo
Burrell, T. N., Victor and Burrell Research and Consulting
Torrie, R., Assistant Co-ordinator, Energy Research Group

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Friday, April 4, 1986

The committee met at 9:37 a.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: Mr. Robinson, members of the committee will join us as we move on through the morning. In the light of the time and my attempts to keep this committee on schedule, I will ask you to start.

ASHLEY-ROBINSON MANAGEMENT SERVICES INC.

Mr. D. J. Robinson: In doing my presentation, I am going to assume the members have had an opportunity to read my report and therefore I am going to cover only a very small amount of background material to set the stage for my discussion of assessment and recommendations.

Mr. Haggerty: Are there twins here this morning?

Mr. D. J. Robinson: I deny vehemently that John Robinson is my brother.

First, the events leading up to the demand and supply options study: I am aware Ontario Hydro has covered this already, but I want to highlight a few points. Prior to 1984, the plans were showing a surplus due to the declining load forecasts and the committed plans for generation already in place. The fall 1983 load forecast was marginally higher than the preceeding year and, as a result, the plan that came out for 1984 showed there would be a gap developing between supply and load by the late 1990s.

There were a number of factors going on which prompted Ontario Hydro to get into this kind of study. First, there was a clear recognition by the management that the decisons which were going to have to be made would be strategic in nature. It was not a simple matter of a single option to be selected; there was a whole resource strategy to be put in place.

Management had its share of problems with the declining load forecasts, as had many utilities in North America, and was aggressively seeking a flexible plan. This meant doing a very comprehensive review of the options available, as well as the ways of combining these. It was becoming increasingly evident that the strategy and the resulting plans would be subject to very extensive reviews, most probably involving the public as well as the government, and that those reviews would require an extensive backup of analysis in order to avoid losing time in the final stages.

There were also concerns because of the extended approval processes that were developing for supply options and transmission to support them. It added some weight, one might say, to the advantages and attractiveness of demand options; they are at least a bit more in control because these options do not affect the environment in the same way. There was also a growing knowledge of demand options through work here in Canada, but particularly because a lot of

work was being done in the United States, where there were problems before we had ours. The Electric Power Research Institute, was also developing information and studies.

It was also becoming increasingly apparent that the noneconomic factors, which had always been significant, were going to play an increasing role in the decisions that were going to have to be made. The problems of nuclear waste, transmission and the environment and the concerns about flexibility would have pretty dominating influences; so the study was watched.

I think it is important to ask ourselves whether this is really a change for Ontario Hydro. I want to point out, as was done in Hydro's material and as I do in my report, that this is not Ontario Hydro's first effort in the area of demand options; far from it. It has been involved significantly for 25 or more years in a whole range of options, everything from research to implementation. What it does represent is Ontario Hydro's first attempt to bring the supply and the demand options together into a totally integrated type of study.

Another important question for the committee is what happens after the study is completed with respect to this methodology. Based on our discussions in our interviews with Ontario Hydro, the use of this integrated method is not a one-shot effort by Hydro. It is Hydro's intent to continue to use this technique in future planning studies. At the end of this study, Hydro's intent is to review the methodology, the organization that was in place and the policy base that exists to see whether they are appropriate for future use of this methodology or whether changes are needed. I emphasize there is no commitment to make changes to the organization. It would depend on the results that develop.

The next point I want to cover is the schedule for the study. I know this has already been addressed by Hydro, but I want to hit a couple of highlights. Ontario Hydro has already covered the fact that there have been fairly major slippages in the schedule. It was originally planned to be completed by April 1986. Hydro is now talking of the end of 1986 for its phase 2, the analysis of alternative plans, to be completed. It has formally established phase 3 as a planned development, where it will come out with one particular resource strategy. Phase 4 has been defined to include a government review. This is in addition to the prior assumptions by Hydro of how it would conduct this study.

I would make a point on one item. While we were doing the review there was a work program outline, with which we were provided, that covered the work of phase 2. We have not received an updated work program outline. That in some way limits our comments on exactly what Hydro is doing in phase 2.

The reasons for the schedule slippage have also been touched on by Ontario Hydro. I want to cover a couple of key points. The first is to make it clear that as an independent reviewer it is not really a surprise to me to see there have been slippages. These studies are extremely complex, they are new to the industry and there are limited numbers of qualified staff who can be applied. That might seem to fly in the face of some of the surplus staff situations in Ontario Hydro, but one cannot apply just anybody. Staff must have the appropriate skills.

The other items on the slide were covered in Ontario Hydro's prior presentations. Other work priorities of the staff are one of the major reasons

that Hydro has tabled. In our discussions with Hydro's people, they pointed out that if other contingencies developed in terms of the work priorities of those staff, such as select committee hearings in the fall, then the schedule tabled for phase 2 for December 1986 may also slide further. It is not regarded as a pessimistic schedule, but a tight, realistic one by Ontario Hydro.

The other point I would go back to is the scope and the flexibility of the study itself. This is one of the most comprehensive planning studies that Hydro has had to undertake with respect to the number of the options, the combinations it is examining and the number of alternative plans, on which we will touch briefly a little later.

With regard to complexity, it has involved them in obtaining new tools, which we discuss in the report. It requires new skills and use of new methods. It requires an interaction along organizational units of Hydro more than in the past. Marketing, rate setting, load forecasting and system planning must work in a very integrated and, in a sense, an iterative fashion to put demand-management options into these types of plans.

An extensive number of factors have to be evaluated. These have been put forward by Ontario Hydro, but I will put them up to refresh the memories of the members. The important point to note is that a number of those factors are not hard, quantitative data but are subjective judgements. As a result, Ontario Hydro is holding a public consultation process during phase 1 and phase 2 to try to get some of the preferences and values of the public and reflect them into the planning studies. This action is being taken early in the planning, which is a good move.

The studies are also difficult and in some ways unique with respect to the number of uncertainties that have to be evaluated, and some of those are very major ones. For example, there are the approval times and processes that may occur for the supply options and the related transmission, the uncertainty of what results will be obtained in the demand option area, even if programs are implemented. How quickly will they take hold? How much penetration will occur? Also, there are uncertainties with respect to delays that may occur on the actual decision processes. These put very large uncertainties into what appears at first to be a rather mechanistic process of going through a lot of calculations.

I want to put up a couple of charts briefly to talk about phase 2. Ontario Hydro talked about phase 1 in its earlier discussions and covered what it is about. There are a couple of points the committee should try to understand before we get into the recommendations. As we said already, the schedule and the work program of phase 2 will change, which is not a surprise to me. Their prior review was based on the original work program as it was provided to us.

There are several objectives in phase 2. The first is to determine alternative development plans--in a minute, I will try to illustrate what those really mean with a chart--to assess those various plans against a number of evaluation factors, which we have shown, and to identify the public acceptance issues and present these results to management.

As far as I am concerned, phase 2 can best be regarded as the detailed study work that has to proceed within Hydro with the public consultation process, but in itself does not result in a decision in the putting together

of information. It requires very detailed simulations on energy production and on the reliability for the power system. To carry out those very detailed simulations, extensive amounts of data are required about the power system, estimates of the external world, the fuel costs, the interest rates, the export market, etc. In doing these studies, the load forecast itself becomes a very key item.

There is a chart in the report which tries to illustrate in tabular form what these alternative plans are in the process Hydro is going through. I want to emphasize a couple of points to make sure it is understood.

9:50 a.m.

In the work program outline that was provided to us, Hydro has defined five different alternative plans, each of which has a focus to it. Plan 1 was an all supply-side plan that listed a number of options Hydro would pursue. Plan 2 was an all demand-side plan, essentially seeing how far one could go, sticking purely to the demand options. Plan 3 was an attempt to mix and match the various options in order to come up with a least-cost strategy. In it all options were regarded as being available and used in order of increasing cost-effectiveness.

Plan 4 was a mixed strategy in which Hydro would run various options and combinations to see the results of emphasizing different evaluation factors. For example, you might try to minimize the environmental impact or the capital impact and so on. There was a fifth plan listed in the original work program outline whose essential approach was to try to distribute the resources. One emphasis was to minimize bulk transmission being added. Another was to minimize bulk transmission and to augment distribution.

Time does not allow going into any detail on these, but there are a couple of assumptions within them that have a bearing on the recommendations. There is an assumption in the all demand-side option, for example, that the marginal cost rates at the time of use would be implemented by 1990. There are assumptions in the all supply-side and least-cost options about starting the nuclear project immediately after what was phase 3 in the original program. I suspect it would now be phase 4, the way the plan is laid out. It is important that these alternative plans each have a focus and therefore set some direction, if selected.

The last point I want to cover before getting into the recommendations is to take note of decisions made to date by Hydro while conducting phase 1 and the status of these decisions to date on phase 2. As a result of the work in phase 1, it was decided that a number of options would not contribute effectively up to the period of about 2005. The reviewer has no disagreement with the assessments made.

During the course of the work, Hydro has approved an increase of 50 per cent in the cogeneration rates. This will certainly impact on some of the assessments. There have been three hydraulic projects approved to move forward into either definition or concept phase. Two have gone into definition phase with theoretical implementation by 1993 or 1994, and one has moved into the concept phase for possible implementation by 1997. These in total represent a peak-load contribution of about 1,000 megawatts, if they all proceed.

As a result of the phase 1 work, Hydro recognized it had inadequate information on cogeneration, so there was a project approved by the board in

July 1985, for which funding was also approved, to develop policies and strategies and provide a demonstration of Hydro's interest and willingness to participate. There was also an approval by the board in July 1985 for a market development program. Basically, it can be summarized that money was released in order to go out and get better information. The purpose was to remove some of the uncertainties with respect to strategic conservation: the real potential, the incentives that would be required and how Hydro would have to deliver these programs.

Since the original plan was laid out, with its modification it has been decided that Hydro will assume a formal government review of the development plan put forward as part of phase 4. That was not in the original planning.

From the reviewer's perspective, there are a number of strengths to the study as it has been done so far: Hydro's acquisition of the latest tools, its use of a total economic cost in the phase 1 work as a means of ranking the various options rather than just looking at it from an Ontario Hydro perspective; the fact that it discarded a few options as a result of the phase 1 work--in other words, it has given an opportunity for some of the questionable ones to show whether they can contribute in the more detailed work of phase 2; the fact that Ontario Hydro has not chosen to exclude any options because of perceived possible implementation issues, and there are a number that we will discuss; and the initiatives already described that it took in 1985 to acquire better data about cogeneration and strategic conservation.

Regarding the actual process of decision-making related to demand and supply options, the adoption of this integrated planning technique is a major first step. It is certainly not the end of the work--there are improvements needed--but it is a first honest effort. There is the intent to apply integrated methods in future studies. They stated to me during the interviews that they will carry on using this; it is not a one-shot effort.

There were the efforts taken to obtain public input early in the planning phase--in phases 1 and 2--and the announced intent to go back to the public as part of phase 3. The action they have taken on the three hydro projects, rather than to wait until they get through all the studies, is a positive move. The putting forward in their work program outline of alternative plans that have a particular focus or direction to them helps the external publics to have a view of what is going on.

However, from my perspective, there are a number of weaknesses of the demand and supply options study as it has been handled so far. There are some technical weaknesses to the standard cost method, but Ontario Hydro has addressed those in its report and in its presentation. As a result of the way they are using the results, I do not see that it is a problem. It is a fact, but not a problem.

There is a lack of adequate data, particularly with respect to cogeneration and strategic conservation. There is work going on in parallel with phase 2 to improve those data. That creates the possibility that some of the assessments may have to be redone when those are available. It could alter some of the calculations and conclusions.

In the alternative plans that were laid out in the prior chart, there is no explicit plan that uses fossil-based plants as the main option. As it happens, on that chart, if the nuclear option is considered to become nonviable, then the fossil-based plants are the fallback. I feel that from a

political perspective, since there is so much controversy about nuclear, it might have been wise to have a fossil-based supply plan as well.

There is an error on the chart. I said there was no sensitivity testing of the export market in terms of the values of the export market. I understand, on the basis of the detailed report of phase 1 that we have since received, that testing is done.

In the process of decision-making related to demand and supply options I see a number of possible weaknesses. As we pointed out, these studies involve a lot of hard quantitative data, but they also involve a good number of subjective factors that require judgements. It is a real problem of presentation to bring together the results of the hard assessments and the softer judgement items to make sure the decision-makers can come through with the best decision. The quality of the ultimate choice that is made depends very much on how well that is presented. That is more a statement of fact of a problem that exists. I am not sure we have the answer yet, but we will talk about it in some recommendations.

10 a.m.

There are uncertainties based on the discussions we had with Ontario Hydro about the precise level of detail that will be tabled both to the board level of Ontario Hydro and in the public consultation process. That left some concerns on our part, but once we learned that Ontario Hydro plans to take its alternative plans back to the public for discussion prior to settling on one, if it follows through, that counters the possible weakness about what should be tabled in terms of detail. Certainly the discussion process will bring out whatever details the public and the government feel are necessary.

On the lack of an updated work program for phase 2, we mentioned that there was not one available when we did the review. That does cause some difficulty for external groups such as this or for other public groups when they are trying to ascertain whether there is an adequate coverage in the studies leading up to the reviews.

For example, we showed that five alternative plans, as we understand it, were being reviewed. If the revised work program outline showed something different from that, various groups might wish to comment on whether that is adequate.

We detected in discussions outside Ontario Hydro that there is uncertainty among a number of the external groups who provided submissions about exactly what Hydro's intent is about providing feedback on their comments. We were advised by Ontario Hydro that it intends to provide specific written feedback to each of the groups that submits a brief. It has also advised us, and now noted in presentations to you, its intent to have this public review in phase 3. I feel it will be helpful to get that information to those groups.

There are a number of limitations in the present methods of load forecasting that Ontario Hydro uses. The method used for load forecasting is essentially an econometric model. For the type of study being done here, ideally one has an end-use model. However, within the load forecasting department limited amounts of data and limited resources are available for pursuing end-use models.

Concerning the method used to estimate what is termed natural conservation, which is the conservation that will occur without specific incentives or efforts by government or Ontario Hydro, natural conservation has been separated and forecast by one method, whereas strategic conservation, which is conservation that one will obtain by specific programs and incentives, has been developed through another technique.

These differences raise the possibility of either overlaps or gaps in the forecasts. I would suggest that both of those raise concerns not just for the committee but also for Ontario Hydro. If there is an overlap, then one could believe he is going to obtain more conservation than he actually will and there could be a shortfall in supply. On the contrary, if there are gaps, then one may be missing opportunities where incentives would bring out some further conservation.

There is also some question about the advisability of certain marketing programs that could add to the peak while one is undergoing a study that is trying to lead to a strategic direction and a resource strategy. A specific one that comes up--and we know this was addressed in Ontario Hydro's responses--is the "Stamp Out Cold Feet" program. When we talked to Ontario Hydro about it, Hydro certainly provided some information on the objectives and purposes, which are different from some of those that the public seemed to perceive from it. It certainly raises a question of whether there is a tight integration between the decisions made by marketing and the decisions and studies made by the planning people.

There are also a number of items related to the existing infrastructure that can be interpreted as weaknesses. As we will discuss in a few minutes, there are a number of potential implementation issues that can come up with some of the options, particularly on the demand side, but also on the supply side. It is our understanding from discussions with Ontario Hydro that although those implementation issues are certainly recognized and, indeed, were discussed in some aspect in the phase 1 reports and at these hearings, they are essentially being deferred for detailed work until decisions on the options are made. That is our interpretation. That raises some concerns about whether that will make most effective use of the time available for getting on with some of these options.

I would point out that history shows that the resolution of some of these implementation issues--examples being the use of time-of-use rates, decisions on the financing arrangements that can exist for various incentives and the necessary authorities for Ontario Hydro to get involved in certain aspects, such as joint ventures on cogeneration--can be time-consuming. Any supply options that come out of this set of studies will have to go through the full environmental assessment process, and these will be the first supply options taken through it.

The basic process is the same as that used for transmission. The results on transmission to date have been spotty and have raised concerns in that one is doing very detailed studies with very rigorous calculations of very many variables, and yet one has hanging over him these very major uncertainties about what it will take to get decisions on some of the options. It raises questions in my mind about the value of some of the detailed work if some actions are not taken on these larger problems.

It is a fact that, under the present Power Corporation Act, the principle is that power is delivered at cost. One could view that that puts some limitations on what could be done in demand management if one chose to

use price as a means of managing demand. I am not necessarily advocating that it is the thing to do, but it is an option that is at present limited and one might want to consider whether it should be.

With those strengths and weaknesses in front of us, I would like to talk briefly about what I see as possible contributions to this process by the select committee on energy.

First, in terms of methodology, Hydro has already tabled and discussed a large range of options that are being considered. I have tried to indicate that these studies are extremely complex, and one of the things that makes them so complex and time consuming is the large number of options. The more variables one has to deal with, the more time it takes and also the more difficult it is to present clearly the results and get good decisions. Therefore, if any of the options were considered unacceptable, it would be very helpful if they were delineated and eliminated.

For example, I mentioned that a couple of the plans being evaluated presume that time-of-use rates will be implemented by 1990. If the government felt that that was not either an acceptable option or an acceptable timetable, then such information would alter some of the assessments.

We also indicated that there is some uncertainty about precisely what information will be going forward to the public and to the government for reviews. What I am really trying to say is that what will be put forward has not been thought out in detail yet, and to my mind that raises the possibility of some delays. When one gets down to the real decision-making process, it will be helpful if the committee has some definite views on the kinds of information that should be put forward both in the public discussions and in the ultimate government review. Then, by tabling those requirements with Ontario Hydro, the process itself will move forward more quickly.

It was indicated earlier that, for the process of decision-making related to demand and supply options, Ontario Hydro now plans to have a public review of the alternative plans as part of phase 3 as a way of coming up with a selection of a particular plan, as it has termed it--in other words, a resource strategy.

Mr. Sargent: What would Hydro's position be on a public review of the case for and the case against Darlington? Would Hydro recommend a vote of the people on that? Would it want to put it to the test for public review?

Mr. D. J. Robinson: I quite honestly find it very difficult to comment on what Hydro's reaction would be. I do not think I can speak for it.

Mr. Sargent: How meaningful is the public review if it does not give the public a chance to say what it wants to do on Darlington?

10:10 a.m.

Mr. D. J. Robinson: One of my comments would be that there has already been a select committee hearing on Darlington last fall. I would certainly regard that as a public review.

Mr. Sargent: A vote of the people of this province.

Mr. D. J. Robinson: If that is what the government thinks would be an effective means of getting a measure--

Mr. Chairman: There was one of those last spring.

Mr. D. J. Robinson: They called it an election.

Mr. Sargent: No comment.

Mr. D. J. Robinson: My only comment is that there has been one hearing. I think it is up to the government to decide what the effective forums for discussion are.

Mr. Sargent: I guess you are right.

Mr. D. J. Robinson: That is actually the point of what I am saying here. If the select committee and the government have some definite views on the nature of the public participation process that Ontario Hydro has indicated it will hold for phase 3, then the earlier those views are put forward, the more effective and timely the decision-making process will be. I think one thing that has to be indicated by the committee is whether it accepts Ontario Hydro's basic plan for having the public consultation in phase 3, or whether it has guidance on what should occur beyond the detailed study.

Ontario Hydro has also indicated that there will be a government review in phase 4 before the Ontario Hydro board makes its decision. Again, I think if the select committee has some views on what the process should actually be and on who the participants should be, the earlier that kind of thing is tabled, the more effective and timely the decision-making is going to be.

A point I would like to make at this time is that what we have thus far is a fairly detailed way of getting through the technical study, getting through phases 1 and 2. Although they have been laid out by Ontario Hydro, phases 3 and 4 have a lot of uncertainty in respect to the actual process because it will be a first time through. It has been the experience thus far that, although one may have a process in place, such as the environmental assessment process, one does not know what will happen until one goes through it.

The last item is on decision-making. I believe Ontario Hydro should be given direction with respect to the extent to which it should improve the data and the resources it has available for end-use models in its load forecasting. That is based on my personal perception that, in these types of studies, end-use models are very important ingredients if they are to be as effective as possible.

There are a number of items related to infrastructure. During the discussions with Ontario Hydro representatives one of the points that came out is that Ontario Hydro has been continuing to invest in demand management studies and projects while it has been undergoing tight controls on its operating, maintenance and administration budget and while it has been sitting with surplus capacity. That certainly makes it difficult, both from the corporate perspective and within the line units, to defend some of those investments at times. One might say there is almost a conflict there.

Yet the government has certainly indicated its desires to pursue demand options. Yesterday, in the discussions by Mr. McConnell in section 8, he commented that it is not too soon to start implementing new demand management activities now so that they will be fully effective in reducing the need for generating capacity in the mid-1990s to late 1990s.

One can still interpret this to mean that one can plan to have the things available just when needed. However, one may ask whether additional emphasis should be put on demand options if one wants to be sure of getting the benefits and wants to get through the uncertainties that exist with them right now. Unfortunately, that is a problem of investment. Any time one is trying to change environment, it requires investment. I think it raises questions of the degree to which Ontario Hydro should take those risks and make those assessments and of the degree to which the government should give direction.

We noted earlier the questioning by some parties about some of the marketing programs, such as "Stamp Out Cold Feet." I think it raises the question of whether the government should give some policy direction with respect to marketing programs that might add to future peaks. It is a fact that any new load, no matter how you try to manage it, runs the risk of adding to the peak. The government may have some view on what is acceptable and on the rate of return one is looking for in having those kinds of marketing programs.

Earlier, we mentioned there are some problems in trying to put together the assessments associated with the hard quantitative data and the various subjective factors. Techniques are available that are used in other parts of industry to try to merge subjective factors with hard quantitative ones. If one wants to get simplistic about it, one could say that a government wanting to edict certain penalty factors could say, "We will pay a premium of 10 per cent for options that have no undesirable environmental impacts," or, "We will pay a premium of X per cent for options that improve the overall Ontario economy in terms of job creation."

Providing such inputs as penalty factors or weighting factors to Ontario Hydro could streamline some of the assessments made in the presentation results. It might even alter some of the rankings of factors. One of the main things is that it might save some time in the final decision process when Hydro is trying to decide which to choose, because things will be on a common basis.

The government has been involved in long-range strategic conservation in a number of ways. I suggest there are further initiatives that could and should be carried on, recognizing that Ontario Hydro can influence but cannot directly cause some of the actions. For example, the government might want to get involved more actively in setting standards for appliances, altering building codes, etc., as ways of ensuring we do not miss opportunities for conservation before the loads get imbedded.

I recommend there be government leadership in resolving implementation issues on the demand options. In a number of cases, third-party co-operation is required for the demand options to be effective. In many cases, that requires change to the status quo. It is a nature of society and people to resist changes to the status quo, even if one is trying to resolve some past inequities.

There have been some prior experiences, such as trying to implement the time-of-use rates, that foundered late in the game. Without debating all the whys and wherefores, the result is that something that looked good in principle and was agreed to by many parties did not go forward. At best, Hydro now is looking to a 1990 implementation date.

One of the difficulties one has is the extent to which Ontario Hydro can take the lead in causing those types of things to be brought into place. One has to recognize that in many ways, Ontario Hydro is suspect for some of the parties that will be affected because they have their vested interests. I suggest the government itself is in a better position to cover the education process of special interest groups and is also in a better position to bring together parties to deal with what in many cases are not policy issues, but rather implementation issues of getting through some of the initial periods of discomfort.

Also, some of the implementation processes for the options may require some financial assistance to get through the initial periods. Again, the government is in a better position than Ontario Hydro to choose options and to take leadership.

10:20 a.m.

My next recommendation is that the committee initiate some government action to define and establish an effective infrastructure for the demand options and for the alternative generation options.

What I am looking towards is, first, the why. As I said earlier, according to the discussions we had with Ontario Hydro, it is planning to wait until options have been selected, see which will have implementation problems and then deal with those. That may not be the latest position but it is the interpretation we had during the review. I see that as a possible loss of time because in the past it has always taken considerably more time than one would expect to get through the details of implementation problems. I do not personally believe there is a question of whether some of these are going forward. It is a question more of amounts and timing. Therefore, I see an advantage to not losing the time in working out some of the details.

Some of the infrastructure items I am suggesting include putting into place authorities that may be required for Ontario Hydro to deal with grants, incentives, joint ventures, etc., and deciding where the financing will come from for certain possible options and incentives. For example, are the incentives for some of the conservation to come out of the rates for the power or from government funds collected through taxes? Is the government to look at them as things that improve the overall economy, and therefore raise the tax base and perhaps provide the incentives? Does it require some joint funding by Hydro and the government?

Also, there are fairly fundamental issues of the levels of incentives that are equitable. Hydro raises this in its papers and in its presentation. Does one provide incentives that equal the total margin of cost of providing new supply or should it be only the difference between the lost revenue and the marginal cost? These are not easy issues and will take some time to resolve.

There are also issues to be resolved in terms of what is the right structure to set up. Is it all to be managed by Ontario Hydro? Does the government have a role in it? Is it a joint effort? Does it need some new organization?

My main point about infrastructure is that there are a lot of things to be worked out. They will take time, probably more than expected, and the earlier they are started the better.

Mr. Sargent: We have a unique situation where the government is in the power business, whereas in the United States most power companies are private enterprises.

Mr. D. J. Robinson: That is right.

Mr. Sargent: Can we gain anything by taking the structure of private enterprise and putting some of that into government enterprise? You must have looked at both structures, private and government. How are we uniquely different from private enterprise?

Mr. D. J. Robinson: I will respond with a couple of points. First, in all honesty, I have not done a detailed look at the structure. Other parties who will be talking have done more looking at that. That aside, I am aware of some of the other structures.

Mr. Sargent: It is not a very fair question then.

Mr. D. J. Robinson: That is okay. Let me respond a bit more. I would be very cautious about taking a look at other parts of North America and thinking one can directly pick up the differences in structures and try to apply them. The situations are far from the same in California or other parts of the United States than they are in Ontario. It is not just that there is a very symbiotic relationship between Ontario Hydro and the government here, but that they also have different problems of supply and of costs, etc.

There are some things we can look at. In some of the American states there has been more direct government involvement in providing incentives and clear policy direction that they want certain options in place and will pay a premium for them, or that they want them and will implement them, even irrespective of price. I am neither equipped nor prepared to say which of those to pick. These are the issues the government has to go through and say: "We want this. We are prepared to pay a premium. We will tell Ontario Hydro what it is." Rather than leave it to a process of iteration between government and Hydro, which can take a long time, it will be helpful if the direction can be given.

The Vice-Chairman: Mr. Sargent, will you please turn a bit more toward a microphone? I understand Hansard is having difficulty picking you up.

Mr. Sargent: I will pass.

The Vice-Chairman: I was not trying to cut you off. I am passing along a message.

Mr. Sargent: I know you would not cut me off.

The Vice-Chairman: I might argue with you, but I would not cut you off.

Mrs. Grier: Let me pick up on Mr. Sargent's question. The direction you are suggesting needs to come is the kind of direction that the Ministry of Energy perhaps could have provided in the past. Is it the proper vehicle to provide some of that direction? Does it need a select committee and a cabinet decision to do that or is it a role that might be appropriate for an entity such as the Ministry of Energy?

Mr. D. J. Robinson: That is a very broad question. Let me give you a simple answer. From my view, much of what I am talking about in terms of direction could come from the Ministry of Energy. It may have some very difficult processes to go through in terms of consultation to come up with its final decisions, but policy directions coming from the Ministry of Energy could help with a number of these things. There is a lot of interpretation possible at present in what is politically and publicly acceptable, as well as what is good business sense.

Mrs. Grier: When you talked about the changes that were needed in the infrastructure, you partially answered the question in my mind when you made the assumption that many of these things were going to happen anyway, and that therefore changes to provide the infrastructure ought to happen. The question I was formulating when you said that concerned the knowledge that Ontario Hydro has problems with the implementation of its supply options, just as it would have with demand options. If it attempted to shortcut the process to cut down on the time involved in implementing, say, a new nuclear station, by beginning the environmental assessment before it had the approval to go--I for one would be screaming from the rooftops--would that be different from suggesting that changes need to be made in regulations and in the infrastructure to facilitate the demand option? Can Hydro legitimately say those changes ought not to occur until we have decided whether to go the demand route?

Mr. D. J. Robinson: Let me address in pieces what is really a multipart question. I mentioned that there is no doubt in my mind that changes will occur and that some of these options will be put in place. What I was getting at was that I am convinced a certain number of the demand options--conservation, some of the load shifting, etc.--will go ahead because on the basis of the studies already done to date, the prices look reasonable and are popular, etc. Recognizing that those things will look attractive, I am saying let us get on with getting some of the implementation issues out of the way.

When it comes to the supply options, I do not think Ontario Hydro has problems. Ontario has problems. We need a viable, reliable power supply in the province if we are to keep the environment we have had to date in terms of business, etc. Processes are in place. There is the environmental assessment process, the consolidated hearings process, etc. However, when one looks at the overall results to date of trying to use those processes, they have not worked well. Without quibbling or debating the whys, they have not worked well.

10:30 a.m.

I would be the last to advocate, and I honestly believe Ontario Hydro would not advocate, shortcutting or eliminating the processes. The government has to take a hard look at the processes it has set up and say, "As much as they must exist and as much as we must have the public process and the consultation, we have to find ways to make sure they are managed processes that come to an end and that they do not have a continuing series of delays." Ultimately, the province will be the loser if we lose good options, whether they be supply options or demand options.

We have to seek a consensus on things instead of an adequate assessment, and get on with it. Some of the decisions that have to be made are not simple and you will never get a consensus, but decisions have to be made. Our processes to date do not seem to get us to some of the decisions; they go on and on. What I am trying to say is, the government will have to take a hard

look and say: "How do we have the necessary consultations? How do we have the process that should exist and yet make it an effective one that reaches an end?

Mrs. Grier: You talked about the standard costs, the formula Hydro has evolved, and said there were some limitations on the standard costs it was using. I do not know how you put it, but you saw it as a problem. Will you expand on that?

Mr. D. J. Robinson: I will not go into technical details, both because of time and because you really do not need to know them to understand what I am saying. Basically, the standard cost process is an approximation method. As part of phase 1, Ontario Hydro wanted to take a look at all the options and do an initial screening, with the result, it hoped, that it would be able honestly to eliminate some of the options as not being viable for the future and therefore to simplify the very detailed work phase 2 requires.

To do that and keep it to a manageable work load, they came up with a method that has been adopted from industry to produce these standard costs. However, because it is an approximation method, there are flaws. Hydro has a range of costs it can produce, depending on what is assumed. It makes such assumptions as that the mix of fuels that will be in use in any particular hour, and therefore the percentage of hours of the year that nuclear, coal or oil will be the marginal fuel, essentially is fixed for all the years assessed, say 20 or 30 years, depending on the option you are looking at. That introduces an inaccuracy.

Where it produces a major inaccuracy, they do some additional work to improve that. For example, if you try to shift energy from day to night, then you do not use that simplified assumption; you use a more accurate one. It has those kinds of inaccuracies. It also has inaccuracies in that, if you take options that produce a lot more energy than a standard unit is required to produce, you can have excess amounts of credits given to that option, simply because it does not know there are any limitations on how much marginal fuel might be available. There are limits to how much you can displace, so it has approximations.

What I am getting at is that the values they came out with, these standard costs, are not accurate, but they are good enough with the way they are used. If Hydro had used them and eliminated a lot of options as a result, and said, "Too expensive, too expensive, too expensive," I think there would have been a hue and cry out by some the parties involved to say that was unfair. Some very questionable ones have moved forward into phase 2 to give them another shot.

The other thing Hydro did was to use them to order the options within the alternative plans I showed on one chart, but where there is a large mix of options, it is still trying combinations and amounts. It is trying to eliminate the inaccuracy that introduces.

Mr. Charlton: Can I take from that you are saying that in the more detailed phase 2, the approach to standard cost has to improve before they use it to start eliminating options?

Mr. D. J. Robinson: The result in what you are asking is correct, but the specific answer is a little different. They are not using the standard costs in phase 2 other than to say, "How shall we order these options for testing them?" What they do is very detailed production simulations that produce, if you want, the true long-term discounting cost of a whole plant.

That is why it eliminates the problems the inaccuracies may have caused at first.

Mr. Chairman: Thank you, Mr. Robinson.

I take it, Dr. Robinson, that you, Mr. Torrie and Mr. Burrell are appearing as a panel.

Mr. Torrie: Yes. Shall we begin?

Mr. Chairman: Carry on, please.

RALPH TORRIE, DR. JOHN B. ROBINSON AND TERRENCE N. BURRELL

Mr. Torrie: John Robinson, Terry Burrell and I are here today to offer some critical appraisals of the demand and supply options study and the policy context in which the DSOS should be evaluated. My name is Ralph Torrie.

Mr. Chairman: Excuse me, Mr. Torrie. Why do you not sit down, unless you feel more comfortable standing?

Mr. Torrie: I feel more comfortable on my feet, thank you.

Mr. Chairman: All right.

Mr. Torrie: In various ways, we three have all taken an active interest in electric power planning in Ontario for more than 10 years. I do not think any of us are total strangers to this committee. Mr. Burrell is a principal in the consulting firm of Victor and Burrell, John Robinson is a professor at the University of Waterloo. In recent years, I have been consulting on the energy options facing Ontario as well as spending a good part of my time working on the international scene, especially the energy problems facing developing countries.

Ours is not a corporate submission in the sense that it does not represent a single and possibly not even an internally consistent point of view, but we have spent some time co-ordinating our presentations to remove redundancy and we do all share a similar orientation to matters of electric power planning; that it must be done in an integrated fashion in an overall energy policy context in which the transcending public policy goal is to ensure that the people of Ontario get the energy services they need and desire at the least cost, consistent with principles of equity, environmental soundness and other social and economic policy objectives.

We favour a resilient and flexible energy system in which the consumer has the freedom to choose from a multiplicity of technical options that compete to provide energy services on a level playing field. We would argue especially that a fair chance be given to those options which rely on indigenous resources, including brain power, and which stimulate the development of indigenous technological innovation relevant to the global marketplace of the 1990s and beyond.

I am going to begin with a few observations on the historical context which has brought us all together in this place this morning, a modest attempt to provide a perspective on the dynamic environment in which we find ourselves in the late 1980s and on which Ontario Hydro's long-range plans and planning process must be assessed.

Dr. Robinson will then present some specific comments on predictive forecasting as an unreliable basis for system planning; on the DSOS as a step in the right direction, albeit an inadequate response to the imperatives of the energy situation in the late 1980s; on the need for an integrated approach to planning; and on the need for clear political direction.

Mr. Burrell will then follow with some comments on the potential for and the benefits of greater efficency in energy productivity. He will also describe some utilities with significant conservation programs, the conditions which have led to those programs and how they compare with the conditions in Ontario and what this means to the opportunities and choices facing policymakers in this province and especially in this committee.

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I will then finish, probably after lunch by this point, by returning to the broader context and suggesting to the committee that you have a rare opportunity, perhaps a responsibility, to provide a new public policy direction to Ontario Hydro. Not since the formation of the Porter commission some 11 years ago now and perhaps not since the formation of Hydro itself some 80 years ago has there been such a convergence of technological, social and economic opportunities to move Ontario in the direction of a more equitable, efficient, resilient and sustainable energy system.

I would like to begin with a few references to past considerations of the place of Ontario Hydro in the overall public policy context of the province. Let us not forget, the very idea of Ontario Hydro was born out of public policy considerations, very radical ones at the time. You might recall the chairman of Hydro, when he appeared here last fall, recounting the story of how the advantages for the advocates of public power were perceived at the time as being very radical. This was in 1904 and 1905 when the issue was raging about whether hydro should have public or private power development.

Most would agree that history has vindicated those radicals, that Ontario was ahead of its time in recognizing the great advantages of public power, and that the province for many decades was very well served by the idea. However, time moves on, the public policy environment changes, and by 1971 the government was officially questioning the 60-year-old precepts on which Ontario Hydro was founded.

Let me read you a quote from the March 1971 Ontario speech from the throne: "The government is determined to assure the adequacy of our energy supplies for the future. It will ensure that energy is used as efficiently as possible and that its use will not adversely affect the environment, health or life. The government will strive to maintain a choice between the various types of energy to match them with those uses for which they are best suited, and to this end the committee on government productivity has been asked to review the function, structure, operation, financing and objectives of the Hydro-Electric Power Commission of Ontario."

That, of course, led to the Task Force on Hydro. In its first report, the same theme comes through: "Implicit in these recommendations is a conviction that Ontario Hydro must adapt itself to satisfy needs which will have much more to do with broad social demands and expectations than did the needs of the past. They will extend beyond the requirement of providing electrical energy."

That was in 1972. The ink was barely dry on that report before concern over the impact of Ontario Hydro began to spread and escalate. These concerns were related to the implications of its supply-side expansion plans, to the health and environmental effects of a massive expansion of large coal and nuclear-powered plants, the land-use implications of a greatly expanded 500-kilovolt transmission system, and in the end the one that became perhaps the most important in its real impact was the financial implications of Hydro's capital expansion program. I am referring to the concern that eventually led to a cutback in Hydro's borrowing limit by the then Treasurer of the province.

These supply-side issues are a continuing concern throughout Ontario. The slowdown in Hydro's growth rate may have temporarily lowered or seemed to have lowered the level of concern, but I need hardly describe to a group of politicians the clamour that would result if tomorrow morning Hydro were to announce plans for another nuclear or coal-fired power station or another 500-kilovolt transmission line.

Tribunals that were established in the 1970s echoed the earlier recommendations of the task force that a new public policy direction was required for Ontario Hydro. In 1976, the select committee on Ontario Hydro affairs concluded: "While the public and government are increasingly involved with Hydro, there is no single forum or combination of forums that provides an overall public policy direction. The committee recommends that the government develop and clearly articulate government policy towards Ontario Hydro. There will be a new urgency to articulate an overall energy policy for the province. The committee expects that the government, in formulating its energy policy, will follow the committee's lead in taking immediate action before flexibility is lost to build an economy that deals more realistically with the wise and efficient use of our energy resources."

The Royal Commission on Electric Power Planning was required to "examine the long-range electric power planning concepts of Ontario Hydro so that an improved framework can be decided upon for Ontario Hydro in planning and implementing the electric power system in the best interests of the people of Ontario."

The commission concluded: "The present decision-making structure suffers from several serious shortcomings: that it does not allow for the development of a general policy on energy; that the public and the government are not involved at an early enough stage in Hydro's planning processes; and that the absence of an effective review process results in an illogical sequencing of decisions that exacerbate the uncertainties inherent in the planning process." This was Porter reporting in 1980.

The commission's recommendation on these matters was that an independent and permanent energy commission be established to serve both a public advisory function and a regulatory function. This recommendation was spurned by the government of the day with the result that today in this province we do not have an agency or a policy body that is truly capable of assessing the complexity of the issues and the policy implications of Ontario Hydro's demand and supply options study.

Here we are to consider Hydro's latest study of long-term supply and demand options in the context of 15 years of recommendations from the Task Force on Hydro, the Royal Commission on Electric Power Planning, an earlier incarnation of this committee and from the government itself, recommendations that a new public policy direction is required for Ontario Hydro and that

there is a need for an effective mechanism for formulating and implementing energy policy in this province. In the absence of such a mechanism, decisions which ought to be matters of public policy are reduced to matters of corporate strategy.

Implicit in all these recommendations is the realization that the requirements of energy policy are very different now from the requirements in 1905; that the role of electricity in the energy system of today and tomorrow is fundamentally different from its role in bygone days; and that the planning of the supply and demand for electric power and the best use of our public power system must be brought in line with these modern realities.

Before turning to Dr. Robinson and Mr. Burrell for more detailed comments on Hydro's planning process and the difficulties of encouraging conservation in a utility with surplus capacity, I want to make a couple of points about the role of electricity in providing energy services.

As I stated at the outset, we favour an energy-services approach as the most relevant to public policy objectives in the modern environment. Fuels and electricity, after all, are not valued for their own use but for the energy services, such as heat, light and mode of power, that they can provide. There are some energy services for which electricity is the only possible energy source--lighting and electronics, small motors, electrochemistry and so on--but these so-called, electricity-specific end uses comprise a relatively small share of our total demand for energy services, only about 12 per cent in Ontario.

That number is very characteristic of industrial societies the world over and it does not change very much over time either. Under some circumstances, electricity will be used for other end uses, space heat and industrial heat, and for this reason, its overall contribution to supplying energy services tends to be somewhat higher than the 12 per cent that is needed only for electricity-specific applications. In Ontario right now, electricity provides about 16 per cent of our total energy end uses. That includes the electricity-specific 12 per cent.

Nevertheless, this relatively small overall contribution is a very important one. There is hardly a sphere of human activity in modern industrial society that does not depend on electricity in some way, and the reliability of an electric power supply is therefore of central concern to society. It is equally true, though, that the cost of electricity, while disproportionately large on a per joule basis, forms a relatively small part of the value added in manufacturing.

In automobile manufacturing, for example, electricity costs represent less than two per cent of value added. Hand-waving claims about the importance of low-priced electricity to investment decisions by the automobile manufacturing sector need to be considered in the light of this information.

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The complex and derivative nature of the demand for electricity, its relatively high price per unit of delivered energy, the dominance of nonelectricity end uses and the overall mix of energy services demanded by society, all these things contributed to the problems faced by Ontario Hydro when the ground started to shift in the 1970s and when the energy marketplace started to undergo some fundamental changes. It is these types of questions and their implications thatthat Dr. Robinson and Mr. Burrell will now address in more detail.

Dr. J. B. Robinson: At least we will give your necks some exercise, if nothing else, by switching positions here.

I want to talk about the first step in the whole planning process, the one that not only underlies the normal system planning activities of the utility but is also the crucial underpinning of the demand and supply options study and sets the context for any evaluation of where we can or should go. That is the load forecasting process.

As Mr. Torrie indicated, I will be looking at load forecasting from what might be called the societal perspective. Assume that the purpose of electric power system planning, as in any type of energy system planning, is to make the energy services, in this case the electrical services, available at the least social cost to the people of Ontario. Given the major changes Mr. Torrie talked about, the ground shifting under our feet in the 1970s as he put it, there is a need for new approaches to load forecasting and the way we think about looking at future energy and electricity demands. These new approaches go beyond those which underlie the demand and supply options study. They go beyond the changes Hydro is currently undertaking.

I want to make four major points. First, predictive load forecasting, the attempt to discover or determine what the future is most likely to be, has been in the past, and still is today, an unreliable basis for system planning.

Second, the demand and supply options study is a step in the right direction. It moves away from the traditional planning process and brings in some new dimensions, but it is still insufficient in that there are some fairly serious shortcomings, especially with respect to the demand-side analysis.

Third, what is required is not simply adding a DSOS-type of process on to the existing system planning process but instead the development of a fully integrated approach to system planning that incorporates detailed exploratory end-use-based analysis on the demand side.

Finally, Ontario Hydro, for a number of reasons, some of which are beyond its control or outside its mandate, is unlikely to develop such new approaches and unlikely to develop the type of integrated planning process which I will be talking about, without some clear political direction on the part of the government. I would like to talk a little about each of those four points.

For the first, I would like to set the context for the way system planning has been done traditionally. I believe this has been made available to the committee already. Essentially, it is a process by which the load forecast kicks off the whole exercise. Once you have a forecast of what the needs are for electricity in the future, you look at what you have, you see whether you will have enough and you add in those new supplies that you see are necessary. As we have heard, this process has not issued in any new supply decisions for about 10 years because, in going down the left-hand side of the chart, essentially there has been no need for new capacity; instead, there has been a large surplus.

That is the traditional approach: predict loads, subtract the committed program and build to meet the remaining gap, if any. Clearly, in that kind of process, the load forecast is critical. The problem is that the load forecasts have been wrong. To repeat a chart that has been seen in a somewhat different form, we see that Ontario Hydro's load forecast for the year 2000--what they

think is going to happen--has dropped rather significantly over the past 10 years. In fact, over the past 12 years, the forecast has dropped by 58 gigawatts or 58,000 megawatts; that is, 16 and a half Darlingtons that we do not need now that we thought we were going to need by the end of the century. Of course, that drop has occurred in less than the lead time of one Darlington plant. That is somewhere in the order of well over $100 billion worth of capital that Ontario Hydro now says we do not need to build by the end of the century. Of course, it is that drop that has led to the surplus capacity you have heard so much about.

However, it may be that this is an irrelevant consideration because clearly over that time there has been a great increase in the quality of the analyses; they have improved. The forecasting methods are better, there are better data, and there is more sophisticated analysis; so perhaps we should ignore the past mistakes and focus merely on what is going on now. Let us do that now, but let me point out in passing the irony of taking a profession that is based on looking at the past and projecting past trends into the future and saying we should ignore their past record.

Let us look only at the current load forecast. What we find is that Ontario Hydro no longer suggests that it knows what the future demand for electricity will be. Instead, it now acknowledges that there is a great deal of uncertainty--and this is a vast improvement, I think--about what the future demand will be.

This slide shows the range of uncertainty they now project out to the year 2005. I want to point out one or two things about this. First of all, in the 14 years to the year 2000--the year 2000 is one Darlington away from us in terms of a planning lead time of 14 years, the amount of time it takes to get a new nuclear power station in place--the range is about 10.4 gigawatts or 10,400 average megawatts. That is plus 5,800 megawatts or minus 4,600 megawatts from the recommended forecast, the red line in the middle. This translates to about plus 8,500 megawatts of capacity or minus 6,800--in other words, a range of plus or minus two Darlingtons--by the year 2000.

The first thing is that the uncertainty range is plus or minus two Darlingtons. The second point is that there is only a 60 per cent probability that we will be within that range. What we discover is that we are 40 per cent likely to need more than two Darlingtons more than we are planning to build or the equivalent of two Darlingtons less than we are planning to build in the time it would take us to build one new Darlington. That does not give you a lot of confidence in the ability to make a decision about what to do.

As I said, this recognition is an improvement over past single base-case forecasting where you say, "This is the future and we are going to build to it," and five years later you say, "Oops, we were wrong." This recognizes that the "Oops" is likely to happen and that the range of possible mistakes is fairly large if we rely solely on a single forecast. The implication of this uncertainty has not been fully drawn by Ontario Hydro.

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The implication, it would seem, is that you simply cannot use predictions as a basis for system planning. You cannot use an uncertainty range of 10 average gigawatts as a basis for deciding what to do. It alone does not tell you very much. All it tells you is that almost anything you are likely to do is quite likely not to be right. These predictions are an insufficient basis for system planning.

It is kind of an irony that it was a recognition of the unreliability of the past forecasts--the drop that I showed you--that led to improvements in forecasting that led in turn to recognition of uncertainty. Neither the historical record nor the current results give a lot of confidence in our ability to predict. I do not think Ontario Hydro load forecasters would disagree with that. As I said, it is explicitly recognized in that uncertainty.

However, what the predictive approaches ignore is a key result of demand analysis over the past 10 years. The kind of work that has been done since 1973 on energy conservation has almost universally concluded in a wide range of forums, in a large number of different jurisdictions and on different scales that the future level of electricity demand can be significantly influenced; it is to a large degree a question of choice. Whether we end up on the blue line, the red line or the green line will depend largely on the policy decisions that are made, the kinds of system planning decisions Hydro makes, strategic conservation programs the utility might carry out, conservation policies initiated by the Ministry of Energy, etc. What that means is that future demand is not given but is largely a matter of choice, within limits, obviously, limits beyond which the demand cannot be influenced.

Perhaps a more subtle point, but equally fundamental, is that we are already making those choices. Right now we are creating a particular set of conditions that will result in a particular set of energy demands, and the choices typically are implicit rather than explicit. Nobody is choosing future levels of demand in an open way; there is a whole bunch of system planning decisions that will result in particular levels of demand. It becomes rather important, once we recognize that flexibility or uncertainty, to start thinking about choosing the best future level and not simply letting it emerge out of the sort of concatenation of individual decisions that are made by a whole bunch of different actors that may or may not result in the type of future demands that we want.

That is not to say there is a need for centralized control over electricity demand. The point is simply that different levels and different directions of future demand growth are influenceable and will result in different levels of costs and benefits to consumers. Thus, even if prediction worked, if we knew the red line was going to be right, it would not tell us anything about what other options there are out there and their relative costs and benefits. We would not know what else we could do. That suggests that what we want to know is not only what we think is most likely to happen but also what is possible, what else could be done and what is available to us. That means we want an exploratory approach that looks at the costs and impacts of alternative futures.

Essentially, there are two problems with trying to predict the future. The first problem is that it does not work, which is a fairly major problem. The second one is that, even if it did work and we could predict it, we also want to know what else is possible and what else is available. That implies a new approach to load forecasting, a new approach to demand analysis, that focuses on the exploration of alternative demand futures, on the costs and impacts of the range of the different alternatives we have and on implementation. What is required to get to different demand levels? For example, what kind of information would be needed to provide for better energy decision-making on the part of the consumer?

Partly in response to these kinds of considerations dealing with the uncertainty of predictive forecasting and in response to all the other issues Hydro has mentioned, the utility has developed a demand and supply options

study. This study, as you have heard, involves a detailed analysis of demand and supply options. However, the DSOS takes the recommended load forecast as given. That is the base of the study; you take the load forecast and do your strategic conservation analysis separately. They take as given whatever is built into the most likely forecast in terms of assumptions about human behaviour, response and likelihood. That is the basis for their distinction between natural conservation and strategic conservation.

Natural conservation is what is going to happen anyway, and strategic conservation is what you have to cause to happen. It is a little vague because some so-called strategic conservation has already been instituted on the part of the federal government through various conservation programs. That then becomes natural conservation in the sense that it is what you think will happen; from Hydro's point of view, it is not something it is causing to happen.

Given that kind of approach, where you have the load forecast on the one hand and the DSOS on the other hand, you run into certain problems. The first problem is that you are not exploring alternative demand scenarios; you are exploring changes in the most likely demand future. That does not reveal what a wholly different approach might give you. If you started from the bottom and built a number of alternative scenarios, you might get results that would be different from taking load forecasts and subtracting some strategic conservation. Thus, we are not looking at a full range of options.

Second, the relationship between the conservation in the DSOS and conservation in the load forecast is very unclear. You have had some indication of that in the past few days in evidence given by Ontario Hydro. The so-called natural conservation in the load forecast is very hard to estimate; no one really knows what is going on in the forecast. In fact, they used the end-use model to derive their natural conservation estimates, but it was the econometric model that essentially gave them the load forecast. It is not clear that those are directly comparable.

Also, it is hard to specify the natural conservation in terms of how many houses are insulated, how many motors are rewound or what lights are replaced. They do not really know that; so it is very hard to go out and do a strategic conservation analysis separately. You do not know whether you are double counting or whether there are gaps. You heard from Claudette MacKay-Lassonde that Ontario Hydro is concerned with this problem and wants to avoid the problem of double counting and gaps. Unfortunately, it is not clear that they can do it, given the way they are doing the analysis.

Essentially, we have two sets of conservation estimates, one in the load forecast and one in the DSOS. How they fit together is unclear and probably cannot be other than unclear, given that those are two separate pieces of analysis.

Finally, the DSOS itself is just a study, and as you have heard from Don Robinson, we do not know exactly what the role will be in the system planning process. We have a defined system planning process that leads to decisions on new capacity, and we have a study on the side that Hydro has suggested will be very important to the system planning process but in a way that has yet to be decided fully.

The result of these problems is essentially that while DSOS is a good step in the right direction in that it recognizes demand-side options for the first time as a strategic decision option for Hydro in the planning process,

it does not fully provide a means for evaluating those demand options adequately. The approach it represents, therefore, is something like this. I promise this is the most complex the slides get; they get simpler after this. With the standard system planning approach, which I also showed on a previous slide, you have the load forecasts, reviewing the current mix, figuring out whether you need new capacity and building new supplies. That is on the left-hand side. The DSOS is the top four boxes on the right.

11:10 a.m.

I should mention this is slightly modified from the version you may have seen before. I reversed the order of the top two boxes and put in a new arrow because I wanted to emphasize that the DSOS itself starts from the load forecast in the sense that is a given and then does the analysis of demand-side and supply-side alternatives. That leads down again to some decision-making process called integrated resource planning. As I have indicated, we do not know yet what the line between detailed evaluation and screening and integrated resource planning amounts to; it has not been decided.

Essentially, that is the step forward. Assuming that line will be real, we now have a serious look at demand-side options. However, because of the problems I have indicated, what we are looking for is something a little more like this where, instead of separately analysing the prediction of what is likely to happen on one side and then over here doing some conservation analysis that is not clearly related to that and somehow has to be integrated into it, you combine the two into an overall integrated assessment of demand-side alternatives. That is the right-hand side at the top.

For reasons we have heard a lot about, especially from Mr. Fleming, there is a prior box, which is called data collection forecasting and model improvement. Because we have not looked at the demand side for the same amount of time as we have supply, because we do not have as well-developed techniques and because it is relatively new, we need a lot of work on developing data on electricity end uses. What is the stock of motors out there? What efficiencies are they? What is their lifetime? How fast are they being replaced? What services are they providing? We have a bit of that information for things such as refrigerators, stoves and household appliances. We have some stock data there; we know their lifetime and average efficiencies. We do not have as much of that data as we need, especially in the industrial and commercial sectors.

While there is a real need for data improvement, we do have an end-use model in the ministry and in Ontario Hydro that is better than many jurisdictions have, and it is possible to do some kinds of integrated demand analysis. It is not something we have to wait five years to be able to start. We have the tools now; they need improving, but they can certainly be used.

This would result in a process where essentially you are generating a whole set of alternative demand scenarios. The reason you want a whole set of them, and the reason you want them to be integrated, is you want to be able to access which ones are going to be relatively more advantageous. Which have the highest costs? Which have the highest impacts? Which ones would require implementation mechanisms that you do not think are feasible or desirable? Which ones would result in the least total cost to consumers of Ontario?

With some kind of basis for comparing different demand options, exactly the way we do with supply right now--we look at the various options, we compare them and cost them out, and we figure out their contribution to the

system at a 68 per cent load factor--the whole process of supply evaluation would be mirrored on the demand side.

There are three requirements for this type of process to be developed. First, we need detailed end-use analysis. As we have heard, Ontario Hydro does both econometric and end-use forecasting. Econometric forecasting essentially is a top-down type of approach based upon historical relationships among various variables, including electricity demand. However, whatever its merits as a tool in terms of predictive forecasting, econometric analysis does not address the questions I have been talking about: the physical stock of electricity-using equipment--how much there is and how fast it can be replaced--and what would happen if you put in insulation in a million new houses to certain levels.

You cannot address those kinds of questions with the econometric model that Ontario Hydro has now. You have to have end-use data to be able to address strategic conservation questions; it is the absolute basic requirement. We need detailed end-use analysis based upon an energy service approach, based upon the idea that what we are talking about is getting lighting and heating to consumers as cheaply or efficiently as possible; whether that involves supplying more electricity or giving them more insulation should be a matter of analysis and the decision should be made on the basis of which of those presumely is the most efficient or at the least cost. That is the first thing.

Second is some kind of integrated demand scenario. Do not predict your need, and then separately do some conservation analysis and subtract it out. Build a set of demand scenarios from top to bottom or from bottom to top. Third, have more than one and compare their impacts.

Given these three processes, you then are truly in a position to be able to gain access to whether the demand-side options are real and how real they are and to what degree we can count on strategic conservation. Ontario Hydro has suggested there is a lot of uncertainty on the demand side. Part of that uncertainty is precisely because this kind of analysis typically has not been done. One purpose of this analysis is precisely to reduce that uncertainty. That is not to say that end-use analysis reduces predictive uncertainty.

Mr. Rothman talked about the end-use model as not reducing the uncertainty of the load forecast. That is true. The end-use model does not give you better predictions. It does not lend itself to be being used predictively. The end-use model gives you a better understanding of what the relative impacts of alternative scenarios would be; what is available out there; what could or could not be done. It is not fundamentally a predictive tool. Trying to use it as a predictive tool is a bit like using a hammer as a screwdriver. It is not really its fault that it is not a very good screwdriver; you should use it to hammer nails instead.

As I indicated, the type of process being proposed here is something that Hydro is in a position to address. They have an end-use model and a fair bit of end-use data from the marketing group. They are in a position to start doing this kind of analysis and system planning. However, the utility is unlikely to pursue this on its own. They are unlikely to pursue the integrated approach I have suggested here for a number of reasons.

There is no evidence in Ontario Hydro's submissions that it either agrees with or sees the need for the type of approaches suggested here. It is clear that predictive load forecasting still is the basis for system planning

decisions, and it is perceived to be desirable that it continue. It may be partially that Ontario Hydro does not necessarily perceive strategic conservation to be in their best interests; Terry Burrell will say a few more words about that.

Another factor is that such an approach makes it more difficult to justify decisions on the basis of so-called objective need. The advantage of a prediction is that you can say, "We have to build the power station because the neutral science of the forecast tells us that." It allows you to cloak the decision-making process in a mantle of objectivity. The approach being suggested here pushes those choices right up front and makes them explicit. If you are doing integrated demand analysis and look at a whole range of scenarios, you then have to choose. You have to make some decision as to where to go. You are not responding to the neutral reality of a forecast; you are deciding where you should go. That is more dfficult to justify.

Moreover as hydro has very correctly pointed out, it raises important political questions. Is it the mandate of Ontario Hydro to make those choices? To what degree should it be making them? Is there a limit beyond which it is not within its mandate? What are the criteria Hydro should use? They have, of course, asked this committee for explict direction with respect to strategic conservation on exactly these questions. Are their criteria appropriate? Is it the institution that should be making these decisions?

11:20 a.m.

Hydro itself is unlikely to act for a number of reasons. Moreover, they have legitimate concerns about some broader political questions that need to be resolved. These suggest that there is some need for direction to be given to the utility.

Let me close by suggesting that the considerations I have been talking about here are in part rather abstract and technical in the sense they are talking about a planning process. That planning process is crucial to the results of the analysis that eventually form the basis of political decisions. It is the way that you start off the process, the approach you take to demand analysis that largely dictates the kinds of results you get. If you do not take a fully comprehensive view of demand options, if you do not look at the full range and compare them and look at the impacts, you are not going to have a very good basis for deciding you want to go in this direction versus another one.

The type of planning process that underlies the decision-making process within Hydro, or more broadly within the province, is crucial to providing the information you need to make the best decision. With that, I would like to turn to Terry Burrell, who will talk more specifically about the demand-side option.

Mr. Chairman: Members of the committee, I would be prepared to entertain some questions at this time, or we can go on to Mr. Burrell's presentation. I will be guided by your wisdom.

Mr. Ashe: May I ask one question for clarification? I think it is important. Dr. Robinson, could you clarify for me the difference in your perception and the way you described it? If you have a system now, a 100 per cent demand, and someone says through a forecast that at a given time in the future we are going to need 150 per cent, what is the difference between looking at the other side and saying that through strategic conservation we

are going to work that 150 down to 130, then fill the need through supply side, and starting from 100 and working up to 130? The difference escapes me.

Dr. J. B. Robinson: There are two main differences. One is in the way it is being done now. The way you get the 150 and the way you get the 30 reduction are not compatible. You do not know that there is not double-counting, that there are no gaps. There are big problems in attaching the 30 to the 150. It is hard to place very much reliance on that.

Second, you are getting 120 out of that. You are not getting an idea of the range of other possibilities. There may be 180 there and there may be 110. There may be a 90 there. You want to know what are the relative impacts. You want to know that the 180 is impossible and the 90 is impossible and we are somewhere in between. Then you want to know the relative cost of 110 versus 160. The answer is you cannot do it in the way you are suggesting. You cannot place very much credence in the numbers you get and it does not tell you a whole bunch of things you wanted to know. That would be my response.

Mr. Ashe: I do not think it is the answer; but it is fine.

Mr. Snell: Dr. Robinson, Ontario Hydro mentioned to us yesterday that it has been working on end-use models since 1980 when the Porter commission recommended it get involved. They mentioned a number of times the inadequacy of their data and concern on the demand side of the quality of that data. In your experience in other jurisdictions, how long has it taken to get up to speed on end-use models? Is six years enough time to do that?

Dr. J. B. Robinson: It depends what you want to do with them. They are now capable of doing more than they are doing with it. Moreover, they are trying to predict the future. Apparently, from published documentation, they now are using the end-use model, in the most recent forecast, for calibrating it to the econometric forecast. They are picking the econometric as their prediction and making the end-use model give them the same total, and are using that to estimate the natural conservation in the econometric forecast. They are are not using the end-use model to explore.

In answer to your question, we are already up to speed in the sense that we can do more with what we have now. However, there is need to improve. Since 1980, there has not been a lot of work done to improve the end-use model. It has been updated, new data has been put into it. I understand the 1984 data has been put into the end-use model now, but the structure of the model has not changed very much. They have not improved the end-use breakdown, the categories within it have not added to it significantly. That should be ongoing but we are already up to speed in the sense that we could be doing more.

Mr. Snell: They did mention that they were purchasing two models from the Electric Power Research Institute and putting more resources towards it, recognizing an inadequacy of data. Three people are gathering end-use data and there was a discussion whether they were full or part time. Are you familiar with other jurisdictions and the efforts they put towards gathering end-use data? I do not have an idea how extensive the job is. If they truly want to look at and assess on an adequate level the cost-effectiveness of demand-side programs, I do not understand the volume of end-use data they need to do that. Is having three people the reason it takes six years to gather this kind of data or could they put more resources towards that and bring it up to speed faster?

Dr. J. B. Robinson: It is probably a bad thing to ask an academic how much research is needed. The answer is always more is needed than there is. It depends on how you want to do it but Hydro now is commissioning some external consultants to do the strategic conservation analysis--engineering interface on the commercial side and in-house on the residential side. That kind of work is going to make a substantial potential improvement in the capability to do this. It is not clear to me that it is being integrated into the end-use model because of that separation of the strategic demand and supply options study and the load forecasting. If that were used to improve the model, it would be a big improvement.

There is a need for more resources. I cannot speak to the person-hour allocation within the load forecasting and economics division, but more resources are needed to do it. It would not be a bad idea for the ministry, since essentially they have the same model, to be commissioning increased work on improving the model. The ministry has let a contract to improve the commercial sector. It is all ongoing. It is a question of increased resources but not a question of a quantum leap in activity.

More important than the level of activity is the orientation of the activity. What are they using it for? If they are using an end-use model to disaggregate the econometric model, then it is not going to reveal the kinds of things that we are talking about. Even if they devoted their existing resources more towards exploratory integrated demand scenario analysis, we would be better off.

11:30 a.m.

Mr. Burrell: I would like to thank the members of the committee for hearing us today and will start with an overview of what I am going to be talking about.

The first point I am going to make is that there is potential for energy conservation. Almost all of my comments will be restricted to energy conservation. You will notice very few comments on Hydro's supply component of the demand and supply options study. That is not because we have no concerns or perhaps some criticisms of what Hydro has said on the supply side. We would like to focus on the demand side for purposes of the committee's consideration. Presumably others will pick up on supply-side concerns during the rest of the committee's hearings.

First, there is potential. Second, there are benefits to be had from energy conservation. Third, there are, however, constraints to that implementation. Next, despite these constraints in other jurisdictions, we have examples of utilities with significant conservation programs. The next point will deal with Ontario Hydro's perspective on energy conservation, how it is articulated in DSOS and how it has been manifested in the past. Finally, I would like to address some of the opportunities and choices I see the select committee being faced with at this point.

Before I get to potential, though, I would like to clarify two issues. First, where does energy conservation fit into demand-side management? I think there is some confusion between the terms "energy conservation" and "demand-side management." From the utility's point of view energy conservation is only one of three components of a demand-side management orientation. As we have seen in Ontario's marketing program, utilities can use strategic load growth to encourage demand to increase. This is especially relevant in periods where the utility perceives itself as having an economic interest to encourage

that growth in periods of excess supply. That is one approach or one tool to demand-side management.

Another set of tools is load management. Load management is not directed at changing the total demand for electricity. It is aimed at shifting the demand, usually from peak to off-peak periods. In general, the motivation for doing that is economy. It makes economic sense to get generation periods off peak because you have to fill less capacity and the capacity at which you operate tends to be less costly.

Conservation is only one component. It is the third component that aims to lower overall load. From the utility's point of view, it can bring about strategic conservation, as John mentioned, that otherwise will not be brought about. It is usually undertaken when the utility perceives it to be in its best interest to reduce demand rather than either letting it go as it will, increasing and/or shifting it. That is where conservation fits in. It is one component.

What do we mean by energy conservation? Here, we are not talking about energy conservation in the broad sense but energy conservation as related specifically to electricity. Conservation measures, such as weatherizing, using more efficient appliances and so on, recognize, as Ralph said, that people do not want electricity for its own sake. They want it for what it can do for them. Perhaps they want it to condition the space in which they live or to cool food. Conservation recognizes there is more than one way to skin a cat, that in some cases it makes more sense to use less electricity, to condition space and substitute some electricity use with weather stripping or insulation. In some cases, it makes sense to substitute more efficient appliances for electricity use.

The case of refrigeration is an interesting one. I was reading a transcript of the proceedings where one of the speakers from Ontario Hydro talked about conservation as a move from frost-free refrigerators to nonfrost-free refrigerators; the issue being raised that perhaps people do not want to move to nonfrost-free refrigerators.

Over the past decade, conservation analysis has focused on what can be done and what it makes sense to do to meet energy needs as perceived by the people who want them. In the case of refrigeration, if people want frost-free refrigerators, then conservation analysis focuses on the most efficient way to deliver cooling with the convenience of not having to defrost. In the conservation analysis you will see and that will be talked about, the kinds of appliance efficiencies that are used are not ones that assume people are going to change their lifestyle. It assumes the same lifestyle and convenience for electricity use. It is important to keep that in mind.

We are not talking about a decline in the standard of living or the quality of life, but maintenance in the quality of life; in fact an enhancement in the quality of life because advocates of strategic conservation advocate it where it makes more sense from society's point of view, the same services, fewer resources, fewer negative social and environmental impacts.

First of all, with respect to the potential for conservation in Ontario, I am going to show you Ontario Hydro's estimates as presented in the demand-supply option study and briefly mention some other estimates. As was discussed in the previous hearings before the committee, this is an area that is very underdeveloped in Ontario. It is very underdeveloped by Ontario Hydro and by other analysts as well. There is a great need for more information. Estimates of potential that I will present are uncertain and controversial.

This is Ontario Hydro's estimates out of the DSOS for natural conservation, strategic conservation and total conservation. You will see that Ontario Hydro assumes that over the period to the year 2000, between 1,500 and 2,000 average megawatts will come into play on their own. Ontario Hydro estimates between 1,500 and 2,000 average megawatts for natural conservation and a wide range in potential strategic conservation between its low and high ranges, between slightly over 500 megawatts to over 2,000 megawatts. The high in this case is right up to the top, the whole box. Similarly, the total, which combines natural and stragetic conservation, comes in between 4,000 and 4,500 megawatts in Ontario Hydro's estimates.

A few years ago, the soft energy path study that was done by Friends of the Earth estimated conservation potential. It is difficult to compare the estimates because some of the assumptions were quite different with respect to the economic environment with which it was dealing, but many of the assumptions were similar in the prospectus; namely, how much conservation is there to be had? The Friends of the Earth study comes in between 1.5 and two times or two to 2.5 times, depending on the scenario, of the estimate that Ontario Hydro presents here.

I should emphasize that here strategic conservation is not total potential. It is what Ontario Hydro believes is both economical and obtainable. If we were to look at all of the economic conservation in Ontario, the figure would be considerably higher. All of this conservation makes economic sense. The natural makes economic sense because presumably people would not do it otherwise. The strategic makes economic sense from the utility's perspective. It may not from the individual user's perspective, but because it makes sense from the utility's perspective, it makes sense from society's perspective. All of this is economic.

There are benefits from this kind of conservation. First of all, is the point I just made. It costs less for that component that we are looking at, that chunk that has been analysed. It costs less in economic terms. Second, its environmental impacts are virtually negligible. In part, those relate to the fact that the conservation takes place at the point of end use. You do not need to build generating stations. In some cases, you do not need transmission. The environmental effects, the benefits are to be compared with what you would have to do in the absence of conservation. In other words, the benefits of the environmental impact are the saved environmental impact of the supply-side technologies.

11:40 a.m.

As far as employment and economic development are concerned, conservation stacks up with virtually any supply-side option you want to mention, and it is far better than many in terms of distribution of employment and total jobs. It also has some benefits for the system itself, over and above the ones that were mentioned.

To the system, conservation offers flexibility and reduced uncertainty, flexibility because conservation can be brought in small increments. Therefore, in periods of uncertainty about demand--which as Dr. Robinson indicated, we are always in; we do not what future demand is going to bring--it is important. It is important to have resources that you can use to bring on as required.

Reduced uncertainty might be a bit of a question mark in the minds of some. What I mean by that is that some methods of implementing conservation

can result in reduced uncertainty about future demand. For example, if increased conservation is brought about by appliance and building standards, the uncertainty about future appliance and building energy performances is reduced. They will behave according to the standards.

Similarly, if the utility becomes actively involved in developing strategic conservation programs, of necessity it learns a lot more about its load and about consumer behaviour than it would otherwise. This information proves itself to be quite useful. You never eliminate uncertainty, but you can reduce some of the uncertain factors by knowing your market better, as any marketer knows.

Why is the full economic potential not being implemented? Why is it that we have conservation resources out there that make good economic sense, that have positive environmental impacts? As we know, and the committee members have been through this, there are a number of constraints to implementation by the end user.

Information is often a problem, despite the best efforts of government agencies to help overcome that. Despite the best efforts of companies in the energy conservation business to get their message across, lack of information continues to be a problem for implementation.

With respect to the price of electricity, utilities price their electricity at average cost rather than marginal cost. If a utility were implementing conservation and getting the full benefit from conservation, it would look at its marginal costs. It would look at the costs of its least expensive supply option. These can be higher, sometimes significantly higher, than the average cost and therefore, significantly higher than the price the consumer sees. The consumer who is making the decision on the basis of the price of electricity, comparing whether it is better to weatherstrip or to continue to consume kilowatt-hours, is faced with a price that may be too low to reflect the true cost to the society.

Consumers tend to have far less access to capital than the utilities. The cost of capital to the consumer tends to be significantly higher. Hydro has assumed a four per cent real cost of capital for purposes of costing its supply-side options. Four per cent real cost of capital is very difficult for a consumer to get--I would say impossible.

The decision criteria that a consumer uses and that a utility would use if the utility were making decisions about conservation can be quite different. I would like to turn to that.

If there is a single major constraint to the lack of implementation or the underimplementation of conservation in Ontario, it is that the utility makes decisions about the supply side, the consumer makes decisions about the demand-side and they have two very different decision-making perspectives and decision-making environments.

With respect to information and risk perception, as I mentioned, the consumer tends to have less information and may have a higher perception of the risk associated with new technologies. Ontario Hydro, with its technical expertise, is in the position to make a much more thoroughgoing and coherent assessment of what technologies are out there and the risks.

Second, the time frame can be quite different. Consumers tend to want a payback within a relatively short period of time. Ontario Hydro looks at its

costs over the full economic life of whatever it is examining; in the case of a nuclear station, presumably 40 years. That is what is used, in any case. In the case of insulation, which will be in a house for the lifetime of the house, a consumer will use a payback period that is considerably less than the lifetime of the house, five years or less probably.

What that means is that conservation looks less economic to the individual than it would to the utility if the utility were installing the conservation. The same points I made previously about access to capital and cost of capital are true.

When would a utility encourage conservation? When would it make economic sense for a utility to encourage conservation? It makes economic sense for a utility to encourage conservation--again, this is purely an economic perspective--when the increase in costs from generation is greater than the decrease in revenue from conservation. Let us think about that for a minute.

A utility looking to the future has made a projection of its cost of generation and has to decide whether it makes more sense for it to increase generation or to encourage conservation so that extra kilowatt-hour will not be required.

The first point to note is that unless the utility engages in a shared-savings program, the utility gets no revenue for conservation. Conservation results in a decreased sale. Therefore, again in the absence of a shared-savings program, the decrease in revenue from conservation is going to be whatever the utility charges for its electricity, so it is going to lose the sale of a kilowatt-hour. What it saves though is the cost of generating that kilowatt-hour.

Therefore, again from a purely economic perspective, looking into the future, what is it going to cost to increase the generation to make one more kilowatt-hour of electricity? In the long term, we are talking about a cost that would include capital and not just operating cost, of course. The point is that unless the increase in costs is greater than the revenue from conservation, the utility is going to lose out. It does not save more than it sells its electricity for. It does not make economic sense.

What would happen if it went ahead and encouraged conservation, despite the fact that it was not in its economic interest? The rates would increase. That is what would happen.

Let us look at three cases, just to make this point a bit clearer.

In case 1, for the costs saved, I am assuming seven cents a kilowatt-hour, very high costs of the next kilowatt-hour for the utility. For the revenue lost, let us assume the utility sells for four cents. Then the utility economic incentive to encourage conservation--that is, UEIEC--is three cents. It has an incentive. It costs it more than it loses from not selling the kilowatt-hour, so it has a three-cent incentive. It can use that three-cent incentive, in part, at least. It can spend up to three cents to encourage conservation, because it is making money.

The second case is where it costs it exactly the same to generate the next kilowatt-hour as it gets in sales. In that case, there is no economic incentive.

Finally, in case 3, the cost saved is about 2.5 cents per kilowatt-hour. The revenue lost is four cents, so its economic incentive to encourage

conservation is negative. In other words, it loses money by encouraging conservation, so it does not have an economic incentive in that case. I am going to come back to these three cases later on.

11:50 a.m.

What are some of the implications of the constraints that I have discussed for Ontario? What are some of the implications of the fact that there is a major distinction between the way in which the consumer perceives the economics of conservation and the opportunity for conservation, and the way the utility perceives supply side?

The first implication is that there has been an overemphasis on supply side. We have more supply side in Ontario than is justifiable on economic and environmental grounds from a social perspective. The second point is that the total cost of energy services is higher in economic terms, and almost certainly in any other term that you want to mention. We are paying more for our energy services in economic terms than if we would if these constraints did not exist.

What it means is we are losing opportunities. Every year and every day that goes by, there are important opportunities for conservation that are being lost. Decisions are being made every day about what kind of buildings to construct and what kind of appliances to purchase. These are decisions that have very long term effects. As you all know, it is a lot cheaper to build a building to high thermal performance standards than it is to retrofit one. Similarly, once an appliance is bought, it takes a long time before the appliance turns over. Over time, what continues to happen is Ontario loses out on a valuable resource from an economic and other perspective, and the decisions have long-term consequences.

If you want to go back and retrofit that building--say, you have changed your mind and want to encourage conservation--it is going to cost you a lot more to retrofit it. You are not going to get people to change their minds about what refrigerator to use purely on economic grounds after they have made an investment in a refrigerator that has an expected lifetime of 10 years or more. These are lost opportunities for Ontario.

There are utilities that have significant conservation programs. There are utilities in the United States, for example, that have conservation programs which aggressively pursue the development of the resource. This is true in Europe as well.

What makes utilities, what triggers utilities, what encourages utilities or induces utilities to take on that role? If you look at the cases, the factors boil down to three. They may be one of the following three. One condition is supply constraints. Supply constraints can result from a number of different things. In the United States, the most telling constraint has been financial. A number of utilities have not been financially capable of building their next plant. They are constrained and have to look at conservation. Other constraints include the kind that make it difficult for utilities to acquire the next site, to get it built and implement it on time.

The second constraint is the high cost of additional generation. Some utilities in the United States, Puget Sound power utilities in the northeast, for example, have a very high incremental cost for electricity generation. That cost is above its average costs, so the case that I pointed to right at the beginning, case 1, obtains. They have an economic incentive to cut down.

The cost saved in generation is higher than the revenue lost, so they have an economic incentive to engage in it.

Finally, the third point is regulatory direction. Some utilities, such as the Bonneville Power Administration, have regulatory requirements to get serious about conservation. What I am talking about is a serious conservation program that actively attempts to bring about significant increases in conservation, not a cosmetic program.

The three are supply constraints, and/or high additional costs of generation, and/or regulatory direction. I think that is particularly relevant for what it is that we are considering today for Ontario Hydro.

First, Ontario Hydro's perspective is outlined well in the demand and supply options study. In the short run, Ontario Hydro has excess capacity. It is in case 3. It has an economic disincentive to encourage conservation. It has excess capacity and therefore only the operating costs are relevant. The operating costs are lower than average costs, so there is an economic disincentive. Every additional kilowatt-hour Ontario Hydro sells it makes money on, so why would it encourage conservation?

In the long run, Ontario Hydro perceives itself to be in case 2. As it says in the DSOS, "Our long-run costs are not much different than our average costs now." Again, there is no economic incentive for Ontario Hydro to be involved in conservation.

Regulatory requirements: Ontario Hydro is basically unregulated. It faces no regulatory requirements comparable, say, to the Bonneville Power Administration in the United States, which is required to look at conservation as it would at any other resource, but from a social perspective. That does not obtain.

Does Hydro perceive itself to have any supply constraints? In DSOS it does not admit to any. It may be that implicitly Ontario Hydro does perceive itself to have some supply constraints in that it is concerned about whether it can build the next nuclear plant or the next coal plant. However, these are not articulated and we have to presume Ontario Hydro does not perceive supply constraints at the present time.

Going on past experience, given the relatively unregulated nature of Ontario Hydro, the main concern for supply constraints has to be the application of the Environmental Assessment Act. As we all know from past experience, the Environmental Assessment Act has not been applied to major generation projects. If the Environmental Assessment Act is not applied in the future, then Ontario Hydro is relatively confident it will not experience some of the discomfort other utilities elsewhere have experienced.

I want to refer briefly to some comments made previously to you by Lorne McConnell. In his presentation, he indicated that he strongly disagreed with the assertion that Ontario Hydro's perspective and the social perspective were at variance. He stated there was no difference between perceived benefit to the province and perceived benefit to the utility.

It is quite true that in Ontario Hydro's mandate, in its corporate philosophy, it states that its objectives and the province's objectives should coincide. However, the reality is that Ontario Hydro has an economic interest that is fundamentally different from the social best interest when it comes to conservation implementation.

There is a fundamental problem here. If Ontario Hydro is expected to implement conservation, is required to implement conservation and is committed to implement conservation, and is in case 2 or case 3--it perceives itself to be in case 3 now and in the long term perceives itself to be in case 2--then as was mentioned by a number of Hydro spokespeople, the rate base is a key concern, keeping electricity rates down, responsibility to the rate base and responsibility to the customer. Then to fulfil a conservation mandate that would be consistent with the province's economic, social and enviornmental best interests would be at variance with fulfilling its commitment and mandate to minimum costs for ratepayers.

12 noon

That is explicitly stated in the DSOS, so it is surprising that Mr. McConnell would say there is no distinction between Ontario Hydro's best interests and the province's best interests. It may be, and I hope it is, that Mr. McConnell is saying: "Give us the direction. Tell us what to do. Tell us what Ontario's best interest is and we will do it because it is in our corporate philosophy that we will do it." However, if you leave Ontario Hydro to exercise its options as it sees fit and to act in a way that is consistent with what it perceives to be its customers, we are faced with a severe case of corporate schizophrenia.

Ontario Hydro cannot at one and the same time seriously pursue conservation and seriously keep its commitment to its ratepayers. It is an inherent contradiction. I submit that if you look at the record of what Ontario Hydro has actually done in conservation over the past period, it is minimal or cosmetic. The reason for that is not that Ontario Hydro is bad or ignorant; the fundamental reason is it has not been in Ontario Hydro's best interests to do it. It would have involved the violation of its commitment to its ratepayers.

We have a situation in which Ontario Hydro's perceived costs of supply are going to be either below or equal to its average costs, so it does not have an economic incentive. We do not have any regulatory requirements that say Ontario Hydro has to get serious about conservation. We do not have any supply constraints as yet, except those that may be perceived potentially to loom in the future. All those come together to work against Ontario Hydro getting serious about conservation.

There is one other category that I call "other." Under "other," I talk about factors such as corporate bias that constrain Ontario Hydro from doing a serious job on conservation. It is perhaps inevitable in corporations that have a long commitment to a certain path that they have a residual bias in favour of that path.

For example, I suggest all of you who have not already done so should read the section on nuclear in the demand and supply options study; then immediately read the section on energy conservation. Read them side by side and see what you can conclude about a corporate bias, if there is one, as to how resources should be assessed and what resources make best sense for Ontario.

For example, the nuclear section barely touches on the issue of long-term disposal. It does so in a manner that does not even hint there is some concern that a solution is not in place. There is no mention of the retubing at Pickering, a major technical problem. Of course, it is very glowing in economic terms. On the other hand, the conservation section is

replete with negative examples. The first example they use is of a drill that it makes absolutely no economic sense to replace for conservation because it would be silly for anyone to do that. There are concerns with inadequate data on conservation, with the unpredictability of consumer behaviour and with ethical issues concerning the distributional issue involved if Ontario Hydro does act against its economic interest. Some consumers will be subsidizing other consumers. Those who engage in conservation will be gainers; those who do not engage in conservation will be losers. The rate base will go up.

That is an important ethical issue. There is no question about it. However, in the nuclear section, there is not a hint or a mention of one of the central ethical issues of the past three decades; namely, the ethical concern about long-term nuclear waste disposal. This is the sort of perpetual analysis you can go through to try to detect corporate bias. I am not placing a lot of stock on this corporate bias, or I did not when I read the DSOS.

I have a number of concerns about the DSOS analysis and where it appears to be going, but having read the DSOS and having discussed a number of issues with Hydro representatives, I was basically very encouraged by the general drift. I was very encouraged by the fact that they appeared to be taking integrated planning seriously and that in phase 2 they were going to be doing a very thorough analysis.

Part of the problem is that the way in which the analysis is being done, especially the risk analysis, does not take into account such things as technical risk associated with nuclear. There is no factoring in of the fact that no nuclear plant has run its commercial life so we are not sure how long the technology will last. Perhaps the probability is very small that nuclear may not be a viable technology in the longer term, but it is there. The probably is above zero and there is no consideration of that.

Those were concerns I had, having read the DSOS and having talked with Hydro representatives. I felt the basic trend or direction was quite positive. However, my unease has been heightened several times by reading testimony that you have had before you at these hearings.

I would expect the leadership of Ontario Hydro to come to you and say something such as the following: "This is a new era. We do not have any commitments to supply or demand. We have important choices to make. We know demand is uncertain. We know there are risks of overbuilding; we have overbuilt in the past and been wrong in the past. We want to avoid the risks of being either too high or too low. We all want to avoid running out; we want more than enough electricity to be available. However, we also want to avoid overbuilding and wasting society's resources. We look forward to a thorough-going process and a demand and supply options study that will help to reveal to us the optimal mix of supply-side and demand-side technologies for the province."

That is what I would have expected. Because I was not here, I may have missed the nuances, but what I read is the leadership of the corporation coming here with solutions. Maybe I am reading it wrong, but I hear an advocacy of increased electrical intensity by the leader of the corporation. I hear him saying that we absolutely have to build. Those conclusions may come out of the DSOS process. I may agree with him after having done the kind of analysis the DSOS is supposed to have done.

However, what does coming with the solution mean for the DSOS process? If the leadership of a corporation that makes the final fundamental decision,

especially in the absence of regulatory requirements, has already decided that electricity intensity should go up and that we absolutely need supply-side, what does it mean for the process? This is a question I put to you.

Having read the DSOS, I was mildly encouraged, although I had some concerns. However, having heard the testimony, I am much more concerned about the future of the whole process and I am much more concerned that the select committee address itself to these issues in a way that has some significant impact for the future.

We have had an assertion on the part of one of the vice-presidents--I believe it was Mr. McConnell--who was responding to one of the questions put to him about Hydro's expertise on demand side. The question was, "How can Hydro acquire a reputation on demand side that is equivalent to its reputation on supply side?" His response was: "Thanks for the compliment. We already have a reputation on demand side that is international in scope." I have a couple of comments on that.

As I mentioned at the beginning, demand-side management has these components: strategic load growth, marketing, load management and strategic conservation. I do not know whether Ontario Hydro has an international reputation on marketing. They have certainly undertaken some aggressive and presumably successful marketing.

It is also true that Hydro has done some very significant and innovative things on load management. It has implemented interruptible rates since 1961. It has a very significant research program on time-of-use rates. It has one of the most sophisticated load-management assessment programs. This is the long, ongoing study that has looked at load-management hardware, consumer behaviour and that sort of thing. Visitors from far away are coming to look at what Ontario Hydro has done and is doing on that. In a way, it is comparable to what the Bonneville Power Administration is doing for energy conservation on the Hood River project, but it is for load management and not for energy conservation. The fundamental difference between load management and energy conservation in Ontario Hydro's case is that load management makes economic sense.

12:10 p.m.

What about strategic conservation? Ontario Hydro is not a world leader in strategic conservation. When people want to find out how to go about strategic conservation, they do not come to Ontario Hydro. They go to Bonneville Power, Pacific Gas and Electric and so on, just as Ontario Hydro did when it was faced with the task of having to come to grips with this whole strategic conservation area for the demand and supply options study. Where did it go? It went to the Northwest Power Planning Council, to the people who had done some work in the area. That is laudable, but for Mr. McConnell to intimate that there is no problem and we are already world leaders in the area is misleading. It is true for load management and may be true for marketing; it is not true for strategic conservation and it is strategic conservation that you are most concerned about.

There are a number of questions posed for the select committee to grapple with. Should the province try to capture more of the conservation benefits that are out there? If so, how? That is the major question you have to grapple with. What role should Ontario Hydro play? Can Ontario Hydro be an effective delivery vehicle for energy conservation programs? That is something you have to look at very seriously.

Experience in the United States shows that utilities that do get serious about strategic conservation can make a big difference and can have an important impact. However, for the reasons I discussed before, economic self-interest and residual corporate bias, which may be much more significant than I thought it was, Ontario Hydro may not be appropriate. That is something you have to consider. It would be very difficult to deliver a strategic conservation program in the province that really got at the potential in a serious way that did not somehow involve the utility in a serious way. However, that is for you to consider.

What is the role for other provincial institutions? Even if Ontario Hydro is via supply constraints--I will get to that in a minute--regulation or political direction turned around on the strategic conservation issue, there is still going to be lots for other people to do; in fact, there is going to be an ongoing task for regulation if you do it via the regulatory route. I have just sketched out three points: private sector, Ministry of Energy and Ontario Energy Board.

I should have had a fourth point, "other." Maybe the select committee would like to create an institution to do this kind of job, similar to the one that was recommended previously by the Porter commission, or perhaps it is a matter of transforming the OEB.

How might Ontario Hydro's perspective be changed? If you decide you want to use Ontario Hydro as a delivery vehicle, how might you change it? The most direct and obvious is to require it via regulation, either by changing its mandate or by specifying procedures for the utility to evaluate alternatives. That is similar to what is done in the Northwest Power Planning Council, and somebody will be coming to talk to you about that. That involves having a prioritized list with perhaps the kind of premium for conservation that Don Robinson was talking about.

Another approach is to do it indirectly via supply-side constraints. What that boils down to is you do not tell the utility, "You have to consider conservation in the following way"; you just make it difficult for it to build the kind of resources on the supply side that you feel are socially inappropriate before more conservation is brought in. We are not talking about cutting off additional supply; we are talking about sequencing and ordering. That is the issue. There are other possibilities too, such as political direction. Thank you very much for your attention.

Mr. Chairman: Thank you, Mr. Burrell. I assume there are likely to be a number of questions, which we have the option of pursuing now or after we break. What is your choice, members of the committee?

Mr. Sargent: Let us have some questions now while he is hot.

Mr. Chairman: Would you like to go first, Mr. Sargent?

Mr. Sargent: I play the devil's advocate here. You were mentioning that Hydro had no effective program for waste storage. How much money have they got set aside in that fund now? They have about $100 million set aside for that now. What else can they do?

Mr. Burrell: The point I was trying to make is the fact that there is not a long-term disposal solution in place has to be a concern.

Mr. Sargent: It is.

Mr. Burrell: It is not mentioned in the supply options study as a concern that is serious. It is mentioned as a public concern. It is not mentioned as something that one might be concerned about in building the next nuclear plant.

Mr. Sargent: Are you surprised that we have never talked about safety in these hearings?

Mr. Burrell: That is a hard question to answer.

Mr. Sargent: We talked for an hour and a half about lightbulbs, but there was nothing about safety. Who sets up the agenda for this?

Mr. Chairman: A steering committee made up of Mr. McGuigan, Mr. Charlton, Mr. Ashe and myself.

Mr. Sargent: What have you got against safety?

Mr. Chairman: Prior to the new year, it was a steering committee made up of Mr. Charlton, Mr. Ashe, Mr. Sargent and myself.

Mr. Sargent: Sargent did not perform very well then.

Mr. Burrell: I think safety is important. I am sure Hydro, in its assessment of its operating procedures, does take safety into account. It is something that you would want in the demand and supply options study type of assessment, looking at alternative technologies. It is the kind of thing you would want to consider for sure.

Mr. Sargent: You do a hell of a good job and I appreciate that.

Mr. Burrell: Thank you.

Mrs. Grier: If Mr. Sargent is being a devil's advocate, let me try to take the same role. In your last slide you talked about the attitude of top management at Hydro and the sense you got that perhaps what they have said here was different from what was happening in DSOS or was more negative, and yet in your last slide, on "How can the perspective of Ontario Hydro be changed?" I expected to see a line that said, "Change top management."

Mr. Burrell: I would think that is under "Other," the old residual category that always gives you an out. To change top management presupposes a political desire to make change. There is no point in changing top management if you are not going to tell Ontario Hydro that it has to do things that are fundamentally not in its economic interest.

As a ratepayer, I would fault Ontario Hydro for going off on a very expensive conservation program that raised rates, if I were not so concerned that conservation be implemented. I would not really, but from a narrow economic perspective, you cannot expect the utility to do this. I am not criticizing Ontario Hydro for missing something. What I am criticizing Ontario Hydro for is misrepresenting what it is doing and what it can be reasonably expected to do. Hydro is misrepresenting its commitment to strategic conservation. The proof of the pudding is in what Hydro has done, and Hydro has done virtually nothing on strategic conservation.

If we expect Hydro to do significantly more, this committee or somebody will have to convince Hydro that it has to do it, either because it makes

economic sense to do it because it cannot build another plant without first bringing in some more conservation, or by saying: "I am sorry. To get approval, part of your regulatory requirements are that you have to do the following things." I do not think it is unreasonable for Hydro to behave the way it has been behaving. That is the whole point. To think: "Gee, if we only wait another year until they get all this stuff done, and then things will change. They have got the SOS and everything is changing." It is not going to happen unless Hydro is really concerned that unless it appears to and actually does a lot more, it is not going to get approval for the next plant because politically it is going to be under attack.

12:20 p.m.

This is purely a personal opinion. Why do we see it even doing a minimum on conservation? What is the combination? There are some people in Ontario Hydro who really want to do it. They think if they do not do it, it is going to look awfully bad and will constrain their ability to do what they really want to do.

Mrs. Grier: How do you get over the argument Hydro has made that our examination at this stage of the demand and supply options study is premature because Hydro has not finished doing it? They say, "You need our study in order to decide whether conservation is good." We feel intuitively that conservation is good but we do not have the data to demonstrate to those who may doubt whether conservation is good because Hydro has not done its study.

Mr. Burrell: Why would Tom Campbell, if he wants us to wait on DSOS, come here with solutions all ready? Why would he come here and say, "What we need is the following for the future of the province," if there is a sincere commitment? That is what really alarms me. If he had come here and said something different, fine, it would have been consistent with what I see as the DSOS process. But he did not; he came in here to sell an option. This is a person who is going to make decisions. How real is the DSOS process? I have to worry. I do not know. I am not saying that the corporation does not have integrity. Far from it. I am saying there seem to be a couple of agendas here. In my experience, the agenda that tends to get done is the agenda that the top management has.

Mrs. Grier: If we assumed that the agenda was clear and there was nothing hidden and the DSOS was all it was allegedly supposed to be, are there things this committee or the government ought to do now that would improve DSOS? What more information do we need to do that?

Mr. Burrell: The first thing you do not do is wait. The first thing you do is open it up more than it has already been opened up. Open it up to scrutiny. Presumably Hydro has nothing to fear. Let us look at how they are making the assessment, especially in phase II. It is all clouded in "Well, you know, you will hear about it." Part of that reflects a real problem. Ontario Hydro itself is having difficulties in trying to sort out how it will do phase II because it does involve this break with the past on the planning side and on the study side.

I suggest that it be opened up to professional and public scrutiny. Part of the problem in this area is that it is so complex. Without the kind of ongoing regulatory oversight that has teeth, that has staff, that has technical capability, that has resources to keep on it, to look closely at what they are proposing to do for phase II and go through it and set out some guidelines, as they do in the Northwest Power Planning Council for example, it is very difficult.

I know what I would do. I would make sure that Ontario Hydro is regulated. That is the easiest thing. I think you want to do that anyway. Even if you do not want to use Ontario Hydro for strategic conservation, you want to do that. That is an essential first step. There has to be some real control. Without it, it depends on how the economic winds blow and how Hydro perceives its political best interests and what other forces are out there to get it to do things it does not want to do.

Mrs. Grier: When you say open up the phase II process of DSOS, you presumably are not satisfied with the kind of public consultation that was described to us yesterday as to what was going to happen?

Mr. Burrell: There has been no public consultation on phase II to my knowledge. It is just phase I; we have seen the document. Phase II is where the rubber hits the road in the sense that the detailed evaluation that is done in phase II will have a critical outcome for the range of scenarios to be presented, following what Dr. Robinson was saying, and for the things that look reasonable. What Ontario Hydro is trying to do is what looks reasonable for the future of the province. Unless you have a process that ensures that the scenarios that are appropriate get run, you can appear to have considered the world--15 scenarios--but unless you have constructed the right ones, you can miss some real opportunities and opportunites that will not be in the utility's best interest, for example. That is one example.

So far, phase II is still in Hydro and you want to open that up. What you want to do on this committee is to consider seriously what criteria should be used for electric power planning in the province. I do not know that you can bite on that and digest it here. That is a very complex issue. But what you want to do is have someone else do that and get back to you. That someone else eventually should be the body that does the regulation.

Mr. Sargent: On a scale of one to 10, you have been saying that Ontario Hydro's rating in conservation is very low.

Mr. Burrell: It is cosmetic. It is not nonexistent but it is not significant.

Mr. Sargent: On a one-to-10 scale, how important is conservation in the business?

Mr. Burrell: In the electricity business? From the province's point of view, energy conservation is very high. It depends on where you are starting from. Looking at meeting a load in the year 2000, which Hydro would like to do, and looking at the prospects for bringing on conservation and so on, it is significant. The potentials that are discussed are not small. They are significant and they have some of the benefits that I discussed.

Mr. Sargent: Why would they not have a game plan to pick up that extra piece in the United States?

Mr. Burrell: Unless it suddenly becomes in their interest to do that--they are told to do it by a regulatory authority or it is in their economic best interest--why bother? Why would they? It does not make economic sense to them; or they do not perceive it to make economic sense to them.

Mr. Chairman: Could I clear up one point? You put up a slide in which you suggested that one of the benefits of conservation was reduced uncertainty; it allows Hydro an opportunity to get to know what its customers

are doing and these kinds of things. One of the arguments we heard from Hydro was that if you really want to reduce undertainty, the supply-side options are far less uncertain than the demand-side options. You went on to say in this slide that supply-side options are the utility's decision and demand-side options are the consumers' decision. Is there not a fair degree of uncertainty when you are dealing with three million or four million customers?

Mr. Burrell: About what they are going to do?

Mr. Chairman: Yes.

Mr. Burrell: Yes, there is. Especially if you do not know anything to start with. Especially if you are starting at ground zero. Experience in the US has shown that you get better and better at predicting what impact your programs are likely to have. That is the key. We do not know what strategic conservation is going to bring us. We can project how many megawatts we want, but until we try some stuff we will not know. The point is once you get your programs in place you can see what the effects are much more clearly over time. You can use other utilities' experience too as a guide. It is not as though you are totally in the dark. You do start out with a fairly large range of uncertainty, just as with the first nuclear generator you build. How long is it going to take? We have our best estimates and we can see how long it took elsewhere, but until we actually build one in Ontario we do not know.

It is the same with conservation. The more you do, the better off you are in terms of what your programs are likely to do in the future and how much you can count on for strategic conservation. It is not something, though, that you can turn off and turn on. You have to make a commitment and be there for a while to get the information. You cannot then just shut it off and expect to be able to turn it on a year later. It is one of things. For example, the Bonneville Power Administration makes a commitment always to keep at least a minimum amount of activity in all its programs, so when it needs to crank up one of them to cut back demand it can. It does not have to start from zero. There is that uncertainty around what the customers are going to do.

On the supply side, there are lots of analogues to similar uncertainty starting out with something. How long is it going to take to get approval for a plan, for example? If you decide by governmental fiat that it will be built, the uncertainty is reduced considerably, to virtally zero. If that is the kind of environment we want to have in Ontario, we can say, "We can put those plants in place." But there are lots of other uncertainties too on the supply side. On the demand side, especially for a utility that does not have the expertise, there is a fair amount of anxiety. I can sympathize with that, but in a statistical and probabilistic sense you can talk about likely results from programs. In that way, you can start to rely on that resource.

The main point I want to make is it can help reduce uncertainty about future demand itself, which the utility has to be worried about for its supply-side concerns. It does that in the way you pointed out. You know the market better so you hope you can predict a bit better--I almost said something that Dr. Robinson would violently disagree with, "predict a bit better"--test some ranges of futures with more understanding of how variables are likely to interact and how people are likely to behave.

12:30 p.m.

Mr. Snell: Mr. Burrell, you mentioned that an advantage to conservation is in jobs and economic impact. The committee has not seen any

evidence yet that might compare the job impacts of nuclear or large new generation plants and conservation on the other side. From where do you get a sense of that benefit?

Mr. Burrell: There has been work done on that. For example, if you look at an insulation program in Ontario and compare it with nuclear, I think the following things will be true. With any job impact study, you have to worry about where the leakages are. Where is the money going? Is it going to the US, for example? If it is going to the US, then you are going have jobs in the US. In the case of insulation in Ontario, we know the money stays in Ontario.

Mr. Snell: We do with nuclear and construction of its components, do we not?

Mr. Burrell: Yes, that is right. Ontario Hydro estimates that more than 90 per cent of the jobs stay in Ontario. The other thing is, how many jobs? Studies of conservation show that more jobs are created with conservation. Part of it has to do with the fact that you are paying people in the conservation industry less. Each job costs less, so you get more jobs. That is part of the problem with jobs analysis. What does jobs analysis really mean? You have to get at the social issue that underlies the jobs analysis. That is my view.

If you look at something such as insulation in Ontario, there is no question in my mind that it will stack up with anything and there are studies that show that. There is a major study going on right now for the Department of Energy, Mines and Resources on jobs. There are studies that were done in the 1970s as well that I think will bear that out.

Mr. Chairman: Thank you very much.

ORGANIZATION

Mr. Chairman: Do you have a question now?

Mr. Gordon: Yes. We agreed yesterday that we would discuss for a very short period whether we would go to Elliot Lake or take Mr. Charlton's compromise, which was put forward quite graciously. I would like to see this resolved, if possible, before we go to lunch.

Mr. Chairman: I have to be at the whim of the committee to some degree. If the members of the committee wish to discuss that now, I am quite prepared to stay and discuss it.

Mr. Cureatz: I would like to make a comment on it, unless you want to postpone the discussion until next week.

I have some concerns about what we are looking at in terms of demand and supply options studies and the direct ramifications that could take place in Elliot Lake, with what Mr. Sargent has continually referred to as the uranium contracts. I might thank all members for touring my riding of Durham East, and Bowmanville particularly, in regard to the Darlington generating station.

I think it is rather important for us to take a look in terms of the direct impact this will have on a one-mining-town operation in Elliot Lake. I realize we had the mayor before us, but I think all members of the committee can appreciate there is nothing like going on site to get an appreciation of

walking down the main street, having two or three groups come before us with their particular observations and concerns about the likelihood of a decision this committee might make either for or against the continued construction of Darlington or other nuclear stations.

This has been a concern of mine that I have not brought up yet, but there is a thought process that we are going to be getting this report done in whenever the fullness of time is--May or June. I want to tell you, with the humble experience that I have had around this place, that is not going to be done. I think it is going to be impossible, with the kind of legislative agenda we have before this House starting April 22 and the number of other committee commitments that all of us are going to be adhering to, to have various committee meetings in regard to the select committee on energy to look over the report.

I can see us going into the summer, quite frankly. I am not opposed to that for one moment if it gives us the opportunity to make sure that we cover various aspects of the DSOS, and one of those very important aspects, as far as I am concerned, is the impact on the community in Elliot Lake. In anticipation of concerns of my New Democratic and Liberal colleagues, I want to say that I think all of you know my position in the past. As a Deputy Speaker, I was always more than fair to all my colleagues when I was in the chair. This change in government is an opportunity to deal with the frustrations of the lack of degree of openness. I admire that and I want to see its continuation. I think it is refreshing, and I am enjoying it. With that degree of openness, we should take an on-site look at Elliot Lake in regard to the demand and supply options.

Mr. Charlton: My personal sense is twofold. I do not withdraw the compromise I proposed yesterday. In fact, I would be prepared to expand that somewhat if the recommendations this committee is going to consider now have a real and direct impact on either Elliot Lake or the Darlington area. When we were dealing specifically with a topic that clearly would have an effect on those communities, we heard from those communities.

I have no objection to going to Elliot Lake as well as hearing from them here, as my compromise suggested, but at the stage in the process where we are now, trying to make some decisions that will affect the way in which we study the processes for the future, I cannot see the relevance of going to Elliot Lake or listening to a delegation from Elliot Lake again when I do not know, to any great extent, what the relationships of the uranium contracts are, or the future of a nuclear program in Ontario or anything else.

If I am going to look realistically at a presentation from Elliot Lake or if I am going to Elliot Lake to look at the operations there, I want to know what I am looking at them for. I am not going to remember a year from now what I was told at Elliot Lake as it relates to the decision I am trying to make at that point. From that perspective, if in the process of the recommendations we are considering, we are considering recommendations that will have a clear and direct impact, I am prepared not only to listen to people from Elliot Lake but also to listen to people from the Darlington area.

If you think seriously about the presentations we have had from Hydro over the last two days, the presentations we listened to this morning and the presentations we had on Tuesday, I cannot see how we are going to be able to pinpoint any relevance at this stage to what anybody from Elliot Lake is going to say to us. There was a direct relationship last fall when we were trying to make decisions around the specific question of the future of Darlington. We

have questions that we still have to resolve around Darlington, but I do not perceive in the makeup of this committee a whole lot of change in that respect from the report we tabled in December.

12:40 p.m.

Mr. Gordon: I do not wish to take up a lot of the committee's time, but with all due respect to Mr. Charlton, having listened to the various witnesses who have come forward and spoken about various matters--they have often been very theoretical but I have given them my full attention--it is my conviction that ultimately, when we come to sit down with the consultants and discuss our views and look at all the facts that have been brought to bear in regard to supply and demand options, we are going to have an impact upon not only the people of Elliot Lake but also people throughout this province in various degrees, depending upon what recommendations we make.

If we truly are politicians and we truly are a legislative committee, then one of the things we must do is be very conscious of the societal impact that results from decisions or recommendations we make. I do not believe it is possible for committee members to fully understand the economic circumstances that exist in what we call the north shore of this province, along the North Channel. There are 18,000 people in Elliot Lake who are dependent on one industry. It is not a town that is dependent upon other services; it is an economic and social generator for other towns that are linked directly to it, such as Spragge and Serpent River.

We are talking about some very fragile economies. We are also talking about very significant investments that have been made in that region by a major utility through the grace of the government and for reasons of which we are all aware. I believe we must be prepared to study that aspect as well before we make our ultimate decision and, as objectively as possible, make that decision.

At present, due to statements made by Mr. Campbell and others, not by Mr. Charlton, there is some real fear and concern in that community. I know that the steelworkers, the chamber of commerce, the municipal council and the people along the north shore right now are very concerned. We owe that part of the province an opportunity. Whether you see them now or two or three weeks from now is a matter for this committee to decide, But I would very much like to ask the committee to bear that in mind.

Mr. Sargent: I am totally opposed to the suggestion that we go to Elliot Lake, although out of my respect for Jim Gordon, I am wavering. What input do we have on the contracts, the resigning of them, or whether they are going to be signed again? The contracts are up for renewal now, and the government has the power to renegotiate or cancel the contracts and to acquire the land.

We own the land, but we have invested $650 million to build the process at Denison. That has already been spent. What input we have as a committee in that context I do not know. It would be up to Hydro or the Ministry of Energy who know what power there is. The minister knows what is going on but I do not think we will have any input at all as far as the contracts are concerned.

It is not for us to decide, to sit here and make a judgement on a thing that is going to happen anyway. We did not start this. It was started by the former government. We can clean up the act a wee bit but if the government is going to do it for Elliot Lake, it will have to do it for Port Elgin, which is up my way, or for Kincardine. They are hurting because of mothballing the plants there.

I say this kindly. I cannot see us sitting here and telling you guys we are going to put you out of business. We cannot do anything about it. We have no power to keep them in business. Is that not right? If the chairman of Hydro or the Minister of Energy cancels the contract, what can we do about it?

Mr. Cureatz: Eddie, the overall picture I see is that this committee is going to make recommendations as to the direction Ontario Hydro should be taking, be it further conservation, be it nuclear, be it oil or coal.

Mr. Sargent: What about mining uranium, Sam?

Mr. Cureatz: That is right. I know. That is what I am saying.

Mr. Sargent: Did you hear what the chairman of Hydro said?

Mr. Cureatz: Wait a minute. You have been on a long time, Eddie. Let me finish. We are saying a major aspect is the social impact our committee would make in regard to the demand and supply options study. If some of the recommendations involve cutting back on nuclear power, there is going to be a social and economic impact in Elliot Lake directly. Boom, that is it. There will be no more uranium being mined. That is how I look at it.

Mr. Sargent: I do not think Hydro wants to close it down entirely. It wants to give Elliot Lake a share of the business, does it not?

Mr. Cureatz: Let us go and find out.

Mr. Charlton: I do not disagree with anything Mr. Gordon or Mr. Cureatz has said in terms of what we ultimately have to look at. What I tried to say earlier is that if you think clearly about the presentations that have been made to us by either side, we are not in a position to answer those questions now.

One of the things that Hydro said to us yesterday morning, one of the things that our friends said to us here this morning, is that there is a huge lack of data on the questions that are being raised. The questions will certainly have some impact, we know that, but we do not know what that impact will be. There are several things we will be looking at when we make recommendations. One of them I hope will be, as Don Robinson said this morning and all three of our colleagues here implied, that the data base has to be filled. I do not see us as being in the position to consider seriously the economic and social impact on Ontario, on Ontario Hydro, on the Ontario economy or on Elliot Lake or the Darlington area until we have that data.

What are we going to compare? What are we going to talk about with those people now? What are we going to tell them when we bring them in here? Are we going to say we know they are going to close down Elliot Lake? We do not know that.

Mr. Cureatz: I appreciate that, Brian. I think you are saying: "Let us proceed through these aspects of the hearings where we have the various input in regards to the strategy, the economy, etc. We may take a look at the report or, after we have that input, we will go to Elliot Lake to get a better handle on the statistics. At that time we will be able to appreciate more the direct effect of the various options that will be brought forward to us and, if we go to a particular option, the result of that option."

Mr. Charlton: In addition to that, I think and hope what we will be doing in our report and recommendations is suggesting some different

approaches in terms of Hydro's DSOS, some different ways and weightings in the way it looks at criteria, and things like that.

There is the question of whether this committee has any life beyond May. My serious hope is that it does, and that when phase 2 is finished, this committee is part of the review of phase 2 which is going to be much more detailed. We can ask questions about how Hydro has evaluated some of the criteria we have talked and heard about from both sides of this question. We can try to assess whether the social, human and economic impact in Elliot Lake has been properly taken into account in that evaluation and whether the social, economic and human impact in the province as a whole, or in the Darlington area, or any other aspect of those criteria we have been talking about have been used, how they have been weighted, how they have been accounted for.

Mr. Gordon: Then you agree that before we make a final decision report we should go to Elliot Lake?

Mr. Charlton: No. I am saying that if we are considering recommendations in this report that have a direct impact, let us talk about them.

12:50 p.m.

Mr. Gordon: I am saying that the questions you people have raised cannot be answered now but they are going to have an impact on the kinds of decisions we make. We are making decisions about supply and demand options.

Mr. Charlton: We are not going to be making decisions about supply and demand options. That is very unlikely. We may be making decisions about how we want supply and demand looked at for the future. It is very unlikely we will be in a position to recommend in this report that Hydro's projections for strategic conservation are far to low and that we think it has to include 10,000 megawatts of strategic conservation in its planning process. We will not be in that position.

We will be in a position to say we do not think Hydro has seriously looked at demand-side options and we think this, this and this should be changed in its process in order to start changing the way in which demand-side options are considered. At this stage, we will not be in a position to say that, on top of everything Hydro has considered, there are an additional 4,500 megawatts of strategic conservation that should be available by the year 2000 and therefore there is a major impact on Elliot Lake and Darlington. Do you think we are going to be in that position?

Mr. Cureatz: I appreciate Jim's frustration; you are splitting hairs. However, I can understand what you are saying.

Here is a consideration. The steering committee could think about the possibility of extending the life of the committee and go back to the House leaders with the intent that, after the committee takes a look at the report and we get all the data, Mr. Snell would come to us and say: "Here is what we should all be considering. This is what you are driving at. Let us get the statistics first." Then in the summer we will outline a program of the effects the committee's report will have.

Mr. Charlton: It may be in the summer or when phase 2 is finished that we will want to take the next step; or we may decide, as our colleague

Mr. Sargent would support, that while we are waiting for phase 2 of the DSOS, that we want to look at the uranium contracts, the hydro transmission corridor debate that is going on out there in the real world or any number of other things.

In terms of the questions you two want to address, I do not think they can be addressed at this point in any kind of accurate or substantial way.

Mr. Chairman: I want to interject one thought that is absolutely irrelevant to this discussion. I have learned Mr. Torrie has a 15-minute presentation and then we will have completed our day and can carry on with this very intriguing discussion.

Mr. Charlton: Let us go.

Mr. Chairman: What is the wish of the members of the committee?

Mr. Sargent: The motivation for this motion was that the contract is up for renewal. There is a $2.5-billion profit to be resolved. Should that be cancelled or what? I think we are before the fact; we have not arrived at that point yet. Let us find out what happened to the review of the contracts first. Maybe that will not happen up there.

Mr. Gordon: I understand what you are saying. It is quite logical. However, I would like to go back to you again, Mr. Charlton. Some of the things we will be saying in our report will depend, for example, upon whether some of us are in favour of a nuclear industry in the future.

Mr. Charlton: We all have views on that.

Mr. Gordon: Those views are going to impinge on the decision we make and how it affects Elliot Lake.

Mr. Charlton: I do not think we will be able to assess at this stage how it affects Elliot Lake. We will be making a whole lot of recommendations which we hope from our perspective will improve the planning and study process.

Mr. Sargent: Let us ask the chairman who has the power to review the contracts?

Mr. Cureatz: He is not going to know. Let us get this to the steering committee.

Mr. Sargent: Just a moment. I want to find out. You should know that. Which was the party that reviewed the contracts?

Mr. Chairman: I cannot answer that question.

Mr. Gordon: Let us give this to the steering committee to examine.

Mr. Charlton: Can we refer the matter to the steering committee?

Mr. Chairman: Yes, on Hydro and these mines.

Mr. Sargent: Was the Minister of Revenue also involved?

Mr. Chairman: I do not know.

Mr. Sargent: Okay.

Mr. Cordiano: Are we going to resolve this issue now or carry on or what?

Mr. Chairman: I assume it has been referred to the steering committee. Is that the consensus? Is it now the consensus that we hear from Mr. Torrie?

Mr. Sargent: You do not have to buy the steering committee's report, though.

Mr. Gordon: I was not going to say anything, but given that you have made that point, I have been in the Legislature five years, and this is the first time I have ever heard of a committee that refused to go to a community.

Mr. Sargent: Do you want to commit yourself to going to all of my area too?

Mr. Gordon: No, no. A specific request was made. It is a community of 18,000 people. There is a real economic impact on these people and we are saying no. We have to send it to a steering committee to make a decision.

Mr. Sargent: It is all because there is a newspaper story. We do not know the facts yet, Mr. Gordon. Have the contracts been cancelled? We do not know that yet. They are still in business up there.

Mr. Chairman: I am sorry, but we have to make some decisions with respect to finishing off our day.

Mr. Sargent: Let us hear him then.

Mr. Chairman: Let us hear from Mr. Torrie. You are on.

Mr. Torrie: This is going to be a bit of a contrast to the preceding discussion, but I will carry on. I have some words of summary for our joint presentation here today. We are saying that the demand and supply options study and the larger question of the role of the electric power system in meeting the energy needs of the province have to be viewed in the broader context of overall public energy policy objectives. These objectives will best be set by pursuing the goal of providing energy services to the people of Ontario at the least cost. In this light, the current energy supply and demand system in the province is seen as one of inequity and restriction of choice in which the vast potential benefits of improved energy productivity are accessible only to a privileged few.

Ontario Hydro was established about 80 years ago to achieve a basic policy objective, namely, to develop our hydro resources for the benefit of all the people of Ontario. Now, 80 years later, an energy services orientation suggests a new and compelling public policy objective, that is, the unlocking, for the benefit of all the people of Ontario, of the vast potential for increased energy productivity with all the attendant benefits of lower-cost energy services, increased employment--more than enough to cover the dislocations which seem to be looming regardless of what action we take in this field and which you were just discussing--technological innovation, environmental sustainability, improved security. The list of benefits of conservation and efficiency improvements goes on.

The parallel with the situation in 1906 is interesting. In 1906, when Hydro was formed, the development of hydro power was seen as an important response to fluctuating and uncertain energy prices. Today improved energy productivity offers a very similar response to a climate of fluctuating prices and uncertainty. Indeed, a kilowatt-hour or joule of energy saved is worth a premium. It is a permanent form of supply that provides flexibility and resilience in the face of uncertainty.

In 1906, recent technological developments had opened up the possibility of great improvements in the quality of life through the deployment of electricity generation, transmission and user equipment. Today we are in a similar situation where we are in the midst of a technological revolution in energy conversion and end-use devices which makes it possible to have our energy services, including our frost-free refrigerators, with much less fuel and electricity than in the past.

As with the deployment of hydro power 80 years ago, tapping the energy productivity potential for all the people of Ontario will depend on financial and institutional innovations. Ontario Hydro has become a world leader in the production of electrical equipment, largely due to the early development of our public power system. Today the global marketplace for efficient energy-using equipment is vast, and those economies that develop an early industrial capability in this area will have a lasting advantage. Therefore, a serious commitment to energy efficiency in Ontario would stimulate technological innovation in this field.

1 p.m.

The implications for industrial development go beyond just the energy supply industry. Just as in 1906, the development of hydro power made Ontario industry more competitive, so today improvements in industrial efficiency would result from making Ontario's industrial sector more energy efficient. It would improve its competitive position.

The formation of Hydro was largely motivated by a policy objective, that the benefits of electricity should be shared equally throughout society and not be confined to those large private interests that could afford to develop hydro plants on their own. Today we face a similar situation with respect to energy efficiency improvements. Access is now confined to those who can afford to make the initial investment and have privileged access to capital. Ironically, Ontario Hydro is part of the problem in this respect. When consumers pay for a kilowatt-hour, they are paying mostly for the capital charges on supply-side investments that are financed with interest rates and amortization periods that are simply not available to the ordinary citizen.

Another parallel: In 1906, the response was to create Ontario Hydro. There is no more worthy or important question for this committee to address than what should be the public policy response in 1986 to the challenge of creating an efficient and equitable energy system. Some argue that Ontario Hydro itself would be an appropriate vehicle for delivering energy services. There is merit in this suggestion and truth in the claim the utility has the financial skills and the billing network to do the job.

On the other hand, as Mr. Burrell has pointed out, at least in the medium term, Hydro's surplus generating capacity makes it difficult for it to embrace conservation and efficiency. Certainly, there is much economic potential for conservation and efficiency improvement that lies above Hydro's short-run marginal costs, but nevertheless below even the market price of

energy. It would take a strong direction of the sort Mr. Burrell has described to overcome this obstacle.

At least for the time being, we have a situation in which the best interests of the people of Ontario seem to have diverged from the corporate interests of Hydro. Perhaps more important to the question of Hydro's role in promoting energy productivity improvements is the question of whether the organization has the adaptive capacity to make the transition to a modern energy services orientation. Unfortunately, there is very little evidence that the concept is even understood, let alone supported, by the corporation's senior management.

The basic supply orientation of senior Hydro management, which is also reflected in the demand and supply options study, lies behind the plea delivered by the chairman of Hydro the other day when he suggested, "No member of this committee would ever be pardoned if we took decisions in the next few years that cut supply and reliability too fine and as a result caused power shortages." That reminds me very much of a letter another chairman of Hydro wrote to the then Minister of Energy in 1976 in response to the select committee's suggestion that there might be additional room to cut Hydro's capital expansion program even beyond the levels that were mandated by the then Treasurer's limiting of Hydro's borrowing capacity. In that letter to Dennis Timbrell, Robert Taylor said:

"The board"--that is, the board of Hydro--"has serious misgivings about ordering further cutbacks in the system expansion program before the benefits and risks of such a decision are carefully weighed. The $6.5-billion reduction in the expansion program over the last 12 months has increased substantially the risk of having insufficient generating capacity to meet the needs of the province in the early 1980s." That was the Hydro chairman in 1976; it sounds familiar.

I am sorry if these remarks have strayed from the supply and demand options study itself, but if I have made my point, you understand that without a resolution of these broader policy questions, I believe we have no framework for evaluating the DSOS. As I said at the outset, there is a long history of recommendations that need such a framework before we can provide a public policy direction for Hydro. There is a very long list of fine recommendations from the select committee and the Porter commission and so on which have never been implemented because it has somehow been easier to shrink away from the challenge and continue to have Hydro's corporate strategy, by default, form the energy policy of the province. Such a situation may have been acceptable in an era when Hydro's interests were precisely in line with the best interests of the people of Ontario, but times have changed.

The challenge facing this committee is to find a way to make sure the people of Ontario get their energy services at the least cost in a manner which ensures equity, environmental soundness and freedom of choice. Right now, as Mr. Burrell has shown, Ontario Hydro represents, not an instrument for achieving this objective, but rather, it is a positive obstacle. It is failing to rise to this challenge, which will be tantamount to turning our backs on the future of Ontario as a good place to work and live. It would be failing to rise to this challenge for which our children would have the most difficulty forgiving us.

Mr. Charlton: I have a couple of questions I would like to put to the panel. Perhaps all of you can comment on them, even though some of the questions may be directed to specific parts of the presentation this morning.

Dr. Robinson, in your presentation, you set out for us a somewhat different approach to the planning process in terms of where you start. Mr. Ashe earlier raised the question with you about what is the difference. He could not see the difference. He used the 100 and the 150, and you got into that discussion.

I can conceptually perceive the differences, but it would be useful for the committee if we could look at the differences between using those two processes in some data-based way. Is it possible for you to pull together for us some demonstration of that from other places where a different system has been used, so we can look at the different answers that come out of the process?

Dr. J. B. Robinson: Are you thinking of some other jurisdictions or other analytical processes?

Mr. Charlton: We got into this debate about whether we could compare Ontario to the Northwest Power Planning Council, to California and all the rest of those, but perhaps we can compare the Northwest utility in terms of the answers it got using the old standard method and the answers it got using a newer approach, where you are comparing in a like situation.

Dr. J. B. Robinson: That could be done. I have not seen that information, but a historical review of Bonneville Power Administration's load forecasting, in terms of its results and how it changed once it was mandated to consider the demand options, would be one way around that.

Another example closer to home is comparing Ministry of Energy projections for energy demand in Ontario with the work that Mr. Torrie, mainly, did on the soft path study. That was the difference in approach. One is saying, "What is likely to happen out there?" You come up with some estimate of what type of conservation you will have. The other is saying: "Let us forget about what is likely for the moment. Let us look at what is possible and then try to figure out whether we want to do that, whether it is desirable and whether it is better than what is likely."

The two contemporary studies, the 1983 ministry projection and the Ontario study Mr. Torrie did, came to fundamentally different sets of numbers. Mr. Torrie can speak to this too, but I think there are two main reasons. One is the difference in approach. The purpose of the soft path study was to say what is possible, not what is likely. Second--and it is part of the same thing--the study Mr. Torrie did for the ministry is the most detailed end-use type of study that has ever been done in the province.

This aggregation in the transportation and residential sectors has never been equalled in anything anybody else has done. There is an example of a different approach giving you different numbers.

It is important to recognize the problem is that you cannot compare them directly, because one is a prediction and one is a "what if?" type of scenario. They are trying to answer different questions; so they give different answers. I do not know whether Mr. Torrie wants to comment on that, but that is an Ontario example.

1:10 p.m.

If Ontario Hydro did exactly the same thing within just the electricity field, what is the possible range of future demand levels? What if it went

into a massive promotion, an increasing electricity intensity program, and what if it went into maximum reduction? How would you compare those, build those up from the bottom equivalently and cost them out? Each of those would be very different in the load forecast. The load forecast would be somewhere in between. That would be giving information we do not now have.

I do not know whether that answers your question very well.

Mr. Torrie: Coming back to the refrigerator example might illustrate it a little bit more. Hydro's idea of strategic conservation in that case would be that the utility would pay somebody the difference between the standard cost of a frost-free refrigerator and the cost of an energy-efficient, frost-free refrigerator. That would be a way of buying saved electricity from the utility's point of view. It would be economic in the sense that those saved kilowatt-hours could be bought at a rate which is competitive with supply.

A lot of this is made much clearer when you start from the energy services perspective. It is like an Ockham's razor on these questions. You say: "Look, people want their food cold and they do not want to have to defrost their refrigerator. What is the best way you can accomplish that?" You find that rather than just looking at what happens to be available right now in the Ontario marketplace. You look around and see that there is already mature technology which can provide that refrigeration for those people in a frost-free way at a much lower level of energy efficiency than the best models which are being mass-marketed in Ontario.

What can we do to create a manufacturing base for that type of appliance in this province? What can we do to promote its adoption in the province? That is strategic conservation. When you really take a proactive approach to trying to lower the cost of providing energy services to people. It is also an example of one of the many ways in which Hydro's understanding of the concept is limited.

Mr. Charlton: This is one of the things I talked about at length with Hydro yesterday morning. I understand what you are saying. What I was getting at in my question to Dr. Robinson was that it is obvious that in the way it was presented this morning, at least one member of the committee did not understand the difference. I was looking for ways we can demonstrate it so all the members on the committee understand the difference. Your example is a good one, but I think--

Mr. Torrie: What response does one get when you ask for a description of the actual contributions that make up the strategic conservation element in Hydro's estimates? If I am not mistaken, the response that comes back is, "We are not really sure how much comes from where."

Mr. Charlton: Yes. That is part of the response.

Mr. Torrie: That type of response is impossible in our approach. We build it up from the ground item by item and we say, "This is the amount that comes from this type of technology at this cost," and so on down the list.

Dr. J. B. Robinson: Another way to approach it is if you think, "What is the difference in approach?" It is the difference between simply responding to a future and choosing. Ontario Hydro quite rightly raises some questions about who should choose. As Mr. Torrie pointed out, an activist implication in terms of policy lay behind the formation of Hydro in the first

place. It was a public policy decision that some public initiative was necessary to realize these benefits.

We suggest that for the reasons mainly that Mr. Burrell outlined, that same choice--Mr. Ashe talked about 100 to 150 and then subtracting. You are still responding to the future you think will happen. The lesson is that we do not have 150 any more. Hydro itself now says it is 100 to 200, so you have to choose. We do not have any choice. We have to choose because we no longer have a base case.

How do you choose? You cannot choose with a range of 10 average gigawatts. It does not give you anything to choose from. You must have the kind of analysis you need to make the choice, the impact analysis, the relative-cost analysis. Let us not limit ourselves to 150 minus 30, because then you do not have much choice.

Mr. Charlton: I guess one of the things we should be looking at recommending is exactly that. If we want to be able to look at what is possible and where it comes from in realistic terms, this committee has to look at a recommendation which directs that the information be got, as opposed to sitting back and waiting for Hydro to do that on its own.

Dr. J. B. Robinson: Absolutely. There needs to be a much better basis for making choices, now that we recognize we have to make them and cannot just respond.

Mr. Torrie: There is an argument that capability must also exist outside Hydro; that there is a need for an independent and authoritative source of information and advice on these questions. There are a number of ways you can do it. You can bolster the Ministry of Energy's efforts in this regard. You can go for the Porter commission recommendation of having an independent commission. There are a number of different ways, but somehow you have to be in a position so that, when we get these kinds of letters from the chairperson of Hydro, that we are in danger of running out of electricity in the early 1980s if we cut back our 1976 system expansion program, you can get an informed second opinion. If we had had that informed and authoritative second opinion in 1976, we would be a lot farther ahead today. We would have a lot more flexibility and would have saved billions of dollars.

Mr. Sargent: I move we adjourn.

Mr. Chairman: Thank you. We now stand adjourned until next Wednesday at 9:30 a.m.

The committee adjourned at 1:18 p.m.

N-40

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

WEDNESDAY, APRIL 9, 1986

Morning Sitting

SELECT COMMITTEE ON ENERGY
CHAIRMAN: Andrewes, P. W. (Lincoln PC)
Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Brandt, A. S. (Sarnia PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Mellor, L.

Staff:
Moore, L., Adviser, Electricity Section, Policy and Planning Division, Ministry of Energy
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

Individual Presentations:
Davis, T. D., Vice-President, Marketing and Evaluation, Synergic Resources Corp.; Former Assistant Director, Energy Division, Missouri Department of Natural Resources

Rosenfeld, Dr. A. H., Professor of Physics, University of California, Berkeley; Adviser, Building Science and Acting Program Leader, Energy Efficient Buildings Research, Applied Science Division, Lawrence Berkeley Laboratory

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday, April 9, 1986

The committee met at 9:42 a.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: The committee will come to order. We are pleased this morning to hear from Todd Davis. Mr. Davis, perhaps you might introduce yourself briefly. I think we are aware of your topic, but you may want to personalize it a wee bit at the outset.

TODD D. DAVIS

Mr. Davis: It is a pleasure to be here. I would like to say at the outset that you have a pretty province and a beautiful city, and it is always a pleasure to come to Toronto.

The first transparency I am showing relates to my background, and I would like to go over a little of my 11 years in the utility conservation arena. It started in 1975, when I was with the Missouri Department of Natural Resources, which is similar to the one in your province. Our department was responsible not only for energy resource development but also for conservation, utility planning and so forth. I was very much involved in developing state energy conservation programs, utility conservation programs and power siting issues as well as in developing legislation related to utility planning and management.

I am currently vice-president of marketing and evaluation at Synergic Resources Corp., a consulting firm that has worked with a number of US utilities. We have also worked with the Canadian Electrical Association in the past year on a project that was to investigate applying a least-cost methodology, looking at demand-side program options for a few Canadian utilities.

The next transparency sets out a list of the organizations I have worked with. We have also worked with the US Department of Energy on some projects that involved evaluating US utility conservation program performance. We have also worked with the Electric Power Research Institute, which is the US organization involved in research development and demonstration projects for the electric utility industry, and with a number of other states on a variety of energy management topics.

This is a client list over the past three years in terms of the US utilities we have worked with. It covers the whole gamut in various regions of the United States, from Pacific Gas and Electric and San Diego Gas and Electric to a number of Southwest utilities such as El Paso Electric, Central Power and Light and Southern California Edison. We are working with Northeast Utilities and New York State Electric and Gas on a number of conservation-related projects.

The work we do in conservation and demand-side planning can be classified as marketing research, marketing plans, auditing, utility marketing

programs and least-cost planning. Our firm was very much involved in some of the evolution of the power planning that has taken place in the Pacific Northwest. We have worked with the state of Washington in evaluating the extent to which conservation could defer or permanently postpone the need for Washington Public Power Supply System units 4 and 5. When the Pacific Northwest Power Planning Council was created, our firm was very much involved in some of the initial plans and strategies the council formulated in applying a methodology for utilities in the Northwest to look at least-cost options.

The purpose of my presentation is to assess briefly the current situation in the US related to the industry itself and the appropriateness of demand-side planning and least-cost planning. In addition, I would like to go over some current activities that have been undertaken by US utilities in the area of demand-side planning and least-cost planning. Then I would like to get into some of the nitty-gritty issues that are extremely important and some of the mistakes that may have been made by our federal government and our utilities in relation to developing demand-side programs.

Demand-side programs are relatively new. We do not have a large body of information and research that we can go on to develop programs. That is why it is extremely important for us to look at the history of US utilities and to assess the extent to which we can develop a planning methodology that helps look at all the issues and constraints and make sure we come up with an optimal strategy that is beneficial to the utility as well as the ratepayers. In addition, I would like to share with you some future directions in which I see the US utilities going, which may have some implications for Ontario Hydro and other utilities in Canada.

The US utility situation: First and foremost, a classic difference between US and Canadian utilities is the fact that about 76 per cent of our utilities and two thirds of our power is privately owned capital that is responsible for generating, transmitting and distributing electric energy in the US. However, it is also apparent that even though the ownership could be public or private, a number of common structural and economic trends are under way that affect both privately owned and publicly owned utilities. That is why you see both investor-owned and publicly owned utilities undertaking similar types of demand-side programs.

9:50 a.m.

Another element is that for the most part these privately owned utilities are regulated in terms of retail sales at the state or provincial level. There have been very few initiatives on the part of the federal government to bring about greater utility demand-side management. There is discussion in Congress right now about whether to develop a least-cost planning strategy for US utilities, but for the most part, federal government initiatives to bring about least-cost planning have been very narrow and limited. You usually see least-cost planning as an issue at some regional or subnational level in the US.

There are three major federal initiatives that took place in the US in 1978. The first was the National Energy Conservation Policy Act, which primarily established appliance efficiency standards as well as requiring US utilities of a certain size to provide a residential energy audit. The audit takes between two and three hours to complete, and the program itself has had very limited success in the US in terms of the penetration rate of participants in the program.

The Powerplant and Industrial Fuel Use Act primarily restricted the kind of primary energy that utilities could use to generate electricity. The Public Utility Regulatory Policies Act is a pretty significant one because that more or less placed primary emphasis, from the federal perspective, on cogeneration and other sources of small power production, and it required US utilities to buy small-scale electricity from decentralized sources. That program has had limited success. Only a few states have been very successful in promoting small-scale decentralized power.

With respect to a prevailing industry trend--and from some work we have done in Canada, we feel that, overall, these same structural forces are at play, even though it may not be the case in the province--the electric utility industry, as it is traditionally defined, is a maturing, if not mature, industry. That means a number of things.

First, the overall growth rate for electricity is not as high as it used to be. Second, there are rising prices for each incremental unit of generation that is provided on the system. In the US, some utilities are talking about what we call rate shocks of 25 to 50 per cent as new base-load nuclear generating units are brought on line. Whenever there is a much higher cost for each new addition of generating capacity, that has a tendency to increase the average costs. When average costs of electricity or any product increase, people start looking for alternatives and substituting other measures. That is why conservation activity has been on the rise in the US.

There are also greater threats from such new entrants as cogeneration. Many US utilities have realized their larger, more profitable customers--that is, the industrial and large commercial customers--are the ones most likely to leave the system first and look for substitute forms of energy. This has caused a very critical problem for many electric utilities, because if a large-volume industrial or commercial customer leaves, this customer typically has a very high-capacity utilitization rate and that means the utility system itself is going to operate less efficiently, which will bring about higher rates for residential customers.

Another significant aspect of US utilities is the fact they are highly diverse, and this is one of the reasons why demand-side planning has been evolving in the US. If you were to look at utilities in the Pacific Northwest, you would find there is a large hydro base; in the Midwest, there is a very large base of coal-fired and nuclear generation; and in Texas and in the Southwest, there is a large base of oil-fired and gas-fired generation. The type of primary energy used for generation has a significant effect on the options available for a utility to control its costs. This has posed a major problem for regulators and utilities in the sense of developing an optimal strategy that helps to control the cost of power.

There have been varying regulatory situations in the US. For example, California is a state that has been frequently cited for a lot of innovation activity, and Florida is another. There are only a few other states that have spearheaded new conservation activities on the part of electrical utilities. Such states as Michigan, Illinois, Pennsylvania and New York have only recently decided to encourage their utilities to do more conservation. The process is usually very long and difficult and involves a number of hearings and research projects, all having to do with the fact that there has been no formal methodology developed that helps evaluate supply-side versus demand-side options.

Increasing interest in demand-side management is spearheaded because largely electric utilities in the US have realized the importance of

controlling their costs. Shareholder earnings, in the eyes of Wall Street, have a higher probability of increasing if an electric utility can control its capital outlay, which is significantly influenced by the need for new generation. A utility in the US gets a better return on its investment and its bond ratings are better if it is in a position to restrict capital outlay for new generation.

By the way, if any of you have any questions on what I am saying, feel free to ask them.

Another point is that many of these utility demand-side programs that have been developed have been based on very limited information, very limited marketing research. Basically, what has taken place in the US is that we have conservation programs that have been developed strictly on economic, engineering principles.

Many of the US conservation programs have not had the benefit of any market or behaviour research on the motivations of the end users in terms of why and how energy is used. This is probably the number one priority now in the US in future research activity; that is, to better understand the values and the motivations affecting the use of energy on the part of key decision makers.

The last point is particularly important; it is the point of redefining the mission of the electric utilities in the US. Some utilities, because of regulatory controls and because they are composed of private capital, are now looking into other ventures outside the traditional utility business. This has caused much concern on the part of state regulators, because they want to ensure that the cost and revenues received for rates that customers have to pay for electricity stay within that utility's business realm and are not used to subsidize and promote another business activity.

Basically, there have been three major periods of utility demand-side marketing activity. We generally call the first period a sales period. This occurred when the electric utility industry was a growing industry. This is where every incremental unit of generation was cheaper than the previous unit that was added to the system. It was beneficial to promote the increased use of electricity, because the average cost of electricity would decrease.

Beginning in the late 1960s in the US, the economies of scale, the cost of capital, started increasing so that every additional unit of generation actually caused unit cost or average cost to increase. That is when a lot of regulatory activities started to take place in the US in terms of more utility conservation programs.

Beginning in the mid-1970s, it became evident that utilities were starting to vary significantly in terms of the cost of new generation. It could very well be that an aggressive conservation program might be appropriate for a utility in a high-growth area that had limited reserve margins and was in a situation where it was planning to add maybe eight to 10 large base-load power plants. That is exactly what was happening in the state of Florida.

In other parts of the US, there were utilities that had already made decisions to add nuclear capacity. The growth rate started falling off. Some major structural changes in the manufacturing nature of that utility service territory started taking place, such as at Duquesne Light in the Pittsburgh area, which is heavy into steel. However, the steel industry over the past 10 years has been a declining industry, moving into Third World countries.

When Duquesne Light made its decision to add three large nuclear plants, it expected to have a lot of growth in sales when those plants came on line. What happened was that the demand, the business in the steel industry, tapered off and now Duquesne Light is in a situation where it has a lot of surplus capacity. It has reserve margins in the area of 30 to 40 per cent. That is pretty significant.

10 a.m.

It has been argued that a conservation program for a utility that has a large surplus capacity could actually cause rates to increase because there are fewer units of sales over which to spread those fixed costs. What might be more appropriate in the near term is an aggressive marketing program to help stimulate the sales of electricity so the fixed costs, those three new plants, if they came on line, could be spread across more units of electricity sold, because the end result would be lower average costs.

I want to emphasize the fact I am talking about the short term, because what a utility may want to consider seriously is in the long run restricting all future capital outlay for incremental generation if it is found to raise the average price of electricity.

Therefore, what we see happening in the United States in the 1970s was a situation where the diversity of the electric utility business was significantly increased and there was a need to consider a variety of demand-side options.

Let me briefly go into what is meant by demand-side management. I am sure that term has been used quite a bit over the last week or so.

Demand-side management means a number of things for the electric utility industry in the United States. First, it means the utilities have to be more proactive. They have to make sure the resource composition is more in tune with the external environment. It also means there is a greater recognition that investing in traditional sources of power supply has greater risk, and that when a utility invests as much as perhaps $2 billion or $3 billion, which has been the cost of these new plants in the United States, it is making a significant 30-year commitment. However, a lot of variability can take place over that period.

With demand-side options, or lower cost, you do not need as much lead time to bring them on line and, also, you can more easily take the demand-side measures away. You do not have to make a 30-year commitment to them. Therefore, this additional flexibility in resource planning is a major advantage that US utilities see in demand-side management.

Another dimension of demand-side management in the United States is that we are talking about a planning methodology, a planning framework that has been sorely lacking in US utilities. That is a framework that comprehensively looks at the fixed costs, the capital structure of the utility; the operating characteristics of the utility; and the external market place. It tries to take all these things into account and come up with a program that benefits both the capital structure of the utility and the markets that are served in providing this electricity. Also, the need for the methodology leads to the recognition that there is a need to improve overall utility management in demand-side planning in the United States.

I think how limited the information is on what is happening on

demand-side management in the United States is best illustrated by this next slide. If you look at the publicly reported information on how much the US utilities spend on demand-side management activity, you will probably come up with a figure of around $1 billion. If you look at the proportion of that money that is spent by California utilities, you might get up to about $500 million being spent on demand-side management. If you add the Bonneville Power Administration and the Tennessee Valley Authority, you will be getting up to $850 to $900 million.

What does that tell you? It tells you there are actually very few US utilities that have significant, aggressive, active demand-side management programs under way. There are a number of other US utilities that are doing little things in demand-side management that may account for the remaining amount of money in this slide.

I think a lot of the stature or significance that is placed on demand-side management is really the result of very few US utilities' activities. Now, with the Electric Power Research Institute getting more involved in demand-side management, it is trying to spread this methodology, this new thought that for more than the past 10 years has been localized in very few utilities. It is trying to get other US utilities to do this as well. There is a lot more that can be done in the United States in respect to demand-side management.

What does demand-side management mean in terms of influencing load shapes? Basically, a utility can implement six different types of strategies. The first two are most important to most utilities because that is what really drives the need for new generation facilities. In the United States, most utilities are more concerned about shaving their peak period of use as opposed to promoting conservation, because it is the growth in peak demand that drives the need for new generation.

In addition, many US utilities are concerned about filling in the off-peak period. If you can fill in the off-peak period and shave the peak, you can improve the overall efficiency in the use of the capital or the generating facilities at a utility.

In the cost-benefit analyses we have done of different utility conservation programs, we have found that it is very difficult to economically justify an aggressive utility conservation program unless you can attribute significant demand savings from that program. The utilities in the United States that have been most aggressive in promoting demand-side management have been those that can quantify the savings in demand that can result from implementing a particular program.

For example, Texas Utilities Generating Co., which is located in central Texas, serves Dallas-Fort Worth down to Houston, a high growth area. It has found that with the nuclear plant it is currently involved in, its costs are about $3,000 per kilowatt. By investing in an aggressive demand-side program, that is, promoting high-efficiency heat pumps, air conditioners and direct load control, it can actually get those kilowatts for $150. That is $150 versus $3,000.

Getting more kilowatts from the demand side means you are saving an awful lot of money. The revenue requirements are a lot less. This utility's corporate board of directors decided, "Yes, we ought to put more money into the demand side so we can restrict our capital requirements and, hence, control the increase in rates."

It should also be pointed out that this utility did not totally exclude the traditional source of energy; that is, the supply-side option. It continued to build this plant. That is another significant point I would like to make that some US utilities are doing, including Pacific Gas and Electric.

Demand-side management offers another great advantage to US utilities because it helps diversify the resource base. You do not put all your money into one option. No matter what that option is, there are higher resulting risks the more money you put into that one option. Given the swift changes that are taking place in the utility industry and in energy markets, it is appropriate and good strategic planning to diversify the resource base. That is a key point that PG and E made in its 1985 corporate annual report.

There are other demand-side management strategies that can be promoted. I will not get into the rest of these. What is more important is to realize that a utility, even on the demand side, can pursue two or more strategies simultaneously. There might be a concern here, as there is in the United States, that it is very difficult to promote conservation on the one hand and then to promote load building on the other hand. However, when we work with utilities, we advise our clients that they can, in fact, do that. You can promote conservation and you can promote load building at the appropriate time, provided that certain things are done.

First, you look at the cost and benefits of that, and if unit costs still go down by doing two or more load-shape strategies, it is beneficial to do that. Second, these programs need to be targeted for specific markets. That has been a major mistake that US utilities and the federal government in the US have made when it comes to demand-side management.

Again, the emphasis traditionally has been in designing demand-side programs from an economic, engineering perspective. What US utilities need to do in the future is to ground these programs on behavioural, marketing-research considerations. If these programs can be carefully positioned and the features and benefits of participating in this program or using a particular technology communicated to individual market segments, a lot of that confusion can be controlled or minimized.

10:10 a.m.

Which load-shape objectives should be pursued? That depends on a number of factors: The cost-effectiveness of the programs, the system characteristics of the utility, the strategic goals of the utility and the social goals the utility might have. Publicly owned utilities in the United States typically have broader social goals.

We found in some markets that competition is a major driver of the need for utilities to control their costs and invest more in demand-side management. This is why conservation is becoming extremely important to some US utilities. Promoting a more efficient demand-side technology allows that utility to control more fully the cost impacts of supply-side decisions. It can inhibit somewhat the pass-through of large capital outlays on the supply side by providing more efficient end-use equipment.

Mr. Snell: Did you say competition between utilities or between different ways of serving the end use? What do you mean?

Mr. Davis: I meant competition primarily at the end-user level between electric and gas utilities. In the US there is actually some

competition emerging between two or more electric companies that serve a large industrial user that is close to the transmission lines of another utility. The Federal Energy Regulatory Commission has issued a rule that is trying to bring about much more competition in the gas markets at the wholesale distribution level. There is also some strong interest in bringing about more competition in the wholesale transmission market. That is another way of putting more pressure on US utilities to control their costs and capital outlay. I expect a major trend that will emerge in the next five years is much more competition between US electric utilities, especially for the large industrial users, which will be under tremendous pressure to shop for the cheapest form of energy.

Mr. Snell: Do you consider conservation or efficiency measures brought about through consumer decisions as competition and also as something into which they are diversifying?

Mr. Davis: It is a form of competition, but traditionally in the US conservation activity it is not viewed as such. Most US utilities do not view conservation or even cogeneration as competition per se. It is more a new technology that has to be dealt with.

How does a utility evaluate the appropriate demand-side strategy? The fundamental problem facing US utilities is the fact they do not have a lot of data and information to go by in looking at demand-side strategy options. It is a problem that is endemic to the utilities, largely because for the most part they have not needed to be that concerned about the customers with respect to how they used energy. That is why you see major investments taking place on the part of utilities now to get more load research, more cost-of-service data and more end-use information for specific types of buildings and manufacturing processes. They know the forecasts that have been used traditionally to project demand are not nearly as accurate as they used to be. There is a greater requirement to get more specificity in terms of the end uses in the residential, commercial and industrial markets.

Market research and customer acceptance are critical. To me, they are the most important aspects of demand-side planning right now. In my opinion, there is not nearly so much uncertainty about the engineering possibilities of making buildings more efficient and designing more efficient refrigerators and air conditioners and so forth as there is about getting the marketplace and the end user to accept these technologies. That is the biggest problem.

The main focus of this hearing might be on what kind of cost-effectiveness methodology is appropriate or, "How can we develop a methodology that will look at supply-side and demand-side resources?" To this point in the US, it is often the case in doing cost-benefit analyses that the penetration rate or the level of customer acceptance of that program is an imputed value.

To evaluate the cost-effectiveness of promoting dual heating, let us say, we have to make an assumption about a certain number of those units being placed in the marketplace.

Mrs. Grier: Does the Hood River examination of the market not give some direction about that?

Mr. Davis: That is one example of an effort to come up with market-based estimates of acceptance of a utility marketing program.

Mrs. Grier: I thought its success would illustrate that if you do certain things you can assume customer acceptance.

Mr. Davis: That is very true. Hood River is a case study. It is in the Pacific Northwest. There are some unique economic considerations there. The Hood River project represents a very intensive form of test marketing activity. What is happening at Hood River is good and excellent. The only criticism I have is that we do not see enough test marketing undertaken by utilities. We do not see enough market research undertaken to come up with a reliable estimate of how many of these widgets or units will be placed in the marketplace. It is critical because if we miss on that one point, the cost-benefit analysis and the other planning results will just be in error.

A key point we like to stress in working with utilities on demand-side management is how broad an area a utility considers in looking for options. Traditionally, utilities had a very narrow perspective in looking at supply-side choices. We are now seeing an expansion of their planning horizons. They are looking at not only using traditional base-load plants but also buying power from other sources and using geothermal and other decentralized sources of energy. Therefore, those circles are expanding and they are looking at more choices on the supply side.

We are seeing the same thing happen on the demand side. There is a broadening of the planning horizon in looking at demand-side options, but now we are also seeing a greater call for a more comprehensive holistic view of all the broad choices that are possibly available to US utilities in considering supply-side and demand-side choices, and a greater call to have those compete against each other to come up with the optimal resource mix, both on the supply and the demand sides.

One utility which has spent a lot of time and effort on doing this is Sierra Pacific Power Co. It has developed an integrated resource planning system. The key part is just brainstorming; generating a lot of new resource supply ideas, both on the supply and demand sides. This whole planning process is dynamic and iterative. It keeps going; it is constant. It is never static.

It is constantly modifying and changing its base forecast with its new forecast, given the economics of supplying the energy and the changes in customer acceptance. It is also looking at options on the demand side, and it has spent a lot of time and effort integrating both the demand and the supply sides. The basic strategy is to minimize capital outlay and to come up with a resource mix that has the best present value both to the utility and to the ratepayers. In essence, this is what the utility industry in the United States is evolving towards.

Risk is a key consideration in any resource option that is available to a utility. As I said before, there are greater risks in making a commitment to a 30-year source of energy. There is a need to diversify the resource base and control capital costs. Perhaps the utility that has had the greatest success in this diversity is the Pacific Gas and Electric Co. located in San Francisco and serving northern California.

I have a series of expenditures taken from the annual report of Pacific Gas and Electric. From 1982, it spent about $59 million on conservation and load management programs. By 1984, that had increased to $135 million in conservation and load management programs. I have some quotes here from the utility's 1985 annual report. The first quote is particularly important because it says that it was able to reach the allowable dividend rate for its

shareholders largely because it was able to control its capital costs largely through conservation and load management.

10:20 a.m.

There are a number of problems with demand-side management. It is something the industry will have to grapple with in order to elevate demand-side options on a par with supply-side options. One is that there are limited data. We definitely need to invest more in data collection. It is very difficult for us to see the impacts of demand-side management, unlike our measurement of the performance of a power plant, for which we have instrumentation. We have to know more about human behavior. We must have much more of an open system planning approach in looking at supply and demand options. We need to look at new technologies and how they are accepted by utility customers.

Let me show you a slide on trends in demand-side planning in the United States. "DLC" means direct load control programs, whereby a utility can actually interrupt the use of an air conditioner or heater. There are also thermal storage or dual heat, energy efficiency and solar programs. Basically, with the exception of solar, you see that electric utilities in the United States are dramatically increasing their demand-side programs. These data are based on an annual survey that we do of United States conservation and load management activity for the Electric Power Research Institute. We see a significant increase in demand-side programs in the United States.

Mrs. Grier: What do your figures 0 to 400 represent?

Mr. Davis: Those are the numbers of programs that are being implemented.

Mrs. Grier: The size of the programs is not reflected in that.

Mr. Davis: That is right. The size and expenditures of the programs are not reflected.

Now I would like to talk about a study we did for the Electric Power Research Institute that looked at utility experiences in demand-side programs.

We looked at 25 utilities to identify which factors led to their adoption of a particular mix of demand-side programs. In the detailed field visits we completed, a number of points were stressed: that competition in the local energy markets required a utility to promote greater use of energy-efficient technologies; and utility system characteristics, such as whether a utility had a high or a low load factor and whether it had new capacity expansion requirements that led to the adoption of programs.

We found that corporate culture was significant and important. A few utilities have innovation as part of their management style; they try new things and have closer contacts with their customers. Others tend to have a greater distance between themselves and their customers. That had a lot to do with the types of demand-side programs that were adopted.

We also found that a utility's prior experience with a marketing program had a significant impact on the new types of programs it was willing to consider. This stresses the importance of utilities considering pilot programs. The Pacific Gas and Electric Co. started its history in incentive rebate programs with a lighting rebate. That initial program lasted about

three months and was an overwhelming success. Since that time it has expanded the number and levels of rebates, and now it probably has one of the most liberal rebate programs in the United States to buy kilowatts, kilowatt-hours and natural gas. It has one program called the great PG and E rebate, which offers rebate levels of up to $100,000 to certain commercial, industrial customers to buy the kilowatts as opposed to selling them for more traditional sources of power.

Another significant factor in the United States has been regulatory intervention in demand-side programs. This is a particularly important point. A lot of the conservation activity, even from the utilities you might consider innovative, was still initiated under some regulatory pressure. The activity at Pacific Gas and Electric, Southern California Edison and even in the Pacific Northwest was to some extent brought about by regulatory or government intervention in the marketplace.

A comment I hear off the record from utility management is that after that process--and it was bitter for some utilities over a three-year to five-year period--in looking back, they feel it was a beneficial effort because it expanded their view of the business. It is not just the electric business, with steam generators, transmission lines and so forth; it caused them to look more on the demand side and to have a broader view of the markets they serve. In the end a number of high-ranking utility executives found benefit in having some form of regulatory pressure to do more on the demand side.

Mr. Haggerty: How many electrical utilities are a combination of electric and gas?

Mr. Davis: In the United States?

Mr. Haggerty: Yes, in the private sector.

Mr. Davis: I really do not know that offhand.

Mr. Haggerty: There are a number of them though, are there not?

Mr. Davis: There are a number of combination gas-electric utilities.

Mr. Haggerty: Right. They are under one umbrella.

Mr. Davis: One point that often is not noticed is that Pacific Gas and Electric, which is often complimented as being a very aggressive electric utility in demand-side programs, has targeted its residential programs to the gas side. The examples of PG and E programs are applied to the electric side. The impact and the targeted end uses of the programs are geared primarily towards the gas market. It is the commercial and industrial programs that are geared primarily towards the electric market.

Mr. Sargent: Was your $100,000 rebate program industrial or--

Mr. Davis: It was commercial and industrial.

Mr. Sargent: What city was it in?

Mr. Davis: I think it was made available to its larger commercial industrial customers.

Mr. Sargent: What utility was that?

Mr. Davis: Pacific Gas and Electric, which serves the northern two thirds of California. It has 10 million customers. I do not know how many are commercial or industrial.

Mr. Sargent: Did you rebate the $100,000?

Mr. Davis: Up to $100,000 could be rebated.

Mr. Sargent: Was it?

Mr. Davis: I know some rebate levels went as high as $50,000 or $60,000, but I do not know how many were actually for the absolute $100,000 amount. Pacific Gas and Electric and other California utilities are a few of the utilities that actually report each year how much money they spend on conservation and what the present value benefits are from the programs. It would be pretty easy to find out that information.

Mr. Sargent: What was the net cost of it?

Mr. Davis: I do not know what the net cost was.

Mr. Sargent: That is pretty important in figuring out whether it was worth while. You spent $100,000. Was it worth while?

Mr. Davis: Before a utility gives away the $100,000, it has to do an engineering analysis with the customer. What is critical in the approval of the rebate is the engineering estimate that the utility will actually gain more benefit by giving a rebate of $100,000 than by providing that equivalent amount of energy from a supply-side source. Before it issues the rebate it goes through a rigorous economic evaluation of each opportunity.

Are there any other questions?

Mr. Haggerty: Do you have any numbers on the utilities that are using gas as the source of energy to produce electricity? Let us say the utility is using gas turbines to generate electricity. Do you know the consumption of natural gas in this particular area?

Mr. Davis: Not offhand. There really is not that much natural gas used in generating electricity for PG and E. I know Southern California Edison and other US utilities are now actually trying to consume more gas. It is a very cheap and inexpensive source of energy in the short run because of the surplus gas supplies.

Mr. Chairman: Members of the committee, we should let Mr. Davis finish his presentation and then get into the questions.

Mr. Davis: I have a number of tables for you that are probably illegible up here, but they are in your briefing packet. I will not go through all these programs. I have tried to list the US utilities that have demand-side programs under way and identify their load-shape objectives.

You can see it is primarily peak clipping and valley filling, because this is the major economic driver in terms of the cost and revenue requirements for utilities. Then I looked at the influencing system characteristics that have caused that electric utility to focus on peak

clipping or valley filling. You see that low load factor and the need to improve load factor are major reasons US utilities promote peak clipping and valley filling.

10:30 a.m.

I have also provided information on the same US utilities that identify the end uses they have targeted for peak clipping, valley filling or strategic conservation and the energy-efficient technologies and demand-side strategies they have targeted to improve load factor or to achieve strategic conservation. Obviously, some end-use technologies are better than others in bringing about a desired load-shape change for a utility. The economic consequences are also variable for a utility.

I have some information on specific programs that utilities have implemented. For example, Lincoln Electric, which is a small municipal electric utility in Nebraska, has offered rebates of up to $200 for nonelectric backup heat pumps. This is a utility that views itself as being in a very competitive marketplace. Its average cost of electricity is lower than that of natural gas, but at the same time this utility realizes that if it had to provide on-peak electric energy for heating, it would be very expensive. Its customers would not like it. It is promoting dual heating systems whereby customers can switch over to a fossil energy system during the on-peak periods.

I think dual heating and other forms of dual energy are end-use technologies that will grow in importance in the US utility industry. Florida Power and Light is offering rebates of up to $300 for ceiling insulation as well as rebates for heating and cooling systems.

One thing evolving in the United States is that the more active utilities and demand-side programs are starting to bundle different types of marketing strategies in a single program. "Bundling" is a term used in marketing. It suggests you can bring together two or more different marketing strategies and technologies for a specific market segment in order to optimize the value to that end-use market segment.

For example, if a utility is in a high-growth area where there is a lot of new residential home construction, an appropriate marketing program for that utility might be to promote a superinsulated-type home and an electric heating technology, but to make sure the electric heating technology and the home are very efficient. It might also consider some form of dual heating during the peak period, because that is the economic driver for the utility to save during the on-peak period.

I briefly listed the types of programs to give you an idea of the variety and to highlight that a number of US utilities are starting to bring together two or more technologies in a single program. They are trying to down-size the heating and cooling systems and to reduce the running time of the systems, all to reduce the cost to the utility system and for the ratepayer.

I also have a table listing the functions, advantages and disadvantages of different types of marketing strategies that a utility can use to gain customer acceptance of a demand-side technology. Often in the United States a program will be created arbitrarily. These different types of programs will be selected without much consideration for the end-use markets that are being targeted for the program.

What is really necessary in future programs, especially if utilities are going to place much more emphasis on the demand side, is to do the market research in advance and to know which of these programs are most effective in bringing about the necessary market penetration. Again, this is largely imputed. The choices are not viewed as that great in traditional utility program planning.

I also have some frequencies of the different types of programs that have been implemented by US utilities. For 24 utilities that we looked at, there is a significant amount of customer education; advertising promotion, which is extremely important in the early phases of a program where a new technology is being promoted; and direct contact activity in energy audits--the sizing of heating-cooling systems and competitive analyses of gas versus electric. This is extremely important in reducing risk for the end user.

In the conservation area we see extensive use of rebates and financial incentives, but for utilities that have other load shape objectives, such as peak clipping or valley filling, we see less use of financial incentives as a marketing technique.

We also see an awful lot of trade ally involvement: close work with builders, developers and electrical contractors. We found that rebate programs necessitate an extremely close working relationship with a trade ally group, which helps to leverage the marketing of a program and reduces the cost of the utility's marketing program.

A couple of findings with respect to program design: We found that utility program planning is primarily an iterative process. It does not just go from A to Z; it goes from A to Z, back to A and back to Z. It is a constant process. We found that most US utilities have an unroutine demand-side planning process. The process is not formal enough and it does not fit into the traditional resource planning of a utility. Again, this is a major reason that demand-side planning as a planning methodology is trying to become more formalized in the United States. It has to be formally integrated into utility resource planning.

Supply-side impacts of demand-side programs are not routinely treated. Most US utilities still do not assume the impact of the demand-side program on the supply side as a feedback move.

Some of the major findings of US utilities in implementing demand-side programs: Because of the lack of marketing research and segmentation, it is not surprising to find a wide range of penetration rates and acceptance levels of programs. If you were to look at one utility's acceptance level or penetration rate for a heat pump, it might be about five per cent of the eligible market. Another US utility might be able to achieve a penetration rate of 30 per cent of the eligible market, the reason being that the utility may have done more careful marketing research, it may have intensified the market effort and it may be using the right hot buttons to bring about greater customer acceptance.

A good case in point is the overall acceptance level of the US Residential Conservation Service program, the RCS audit program. On a national level the penetration rate of that program is about three per cent of the eligible market. There were no provisions in this national act related to how US utilities were to market their program. The US RCS program has been a failure from a marketing standpoint. However, there are indications that some utilities have been very successful in promoting the RCS program and have been

able to achieve a penetration rate of as high as 30 per cent of the eligible market, which is a substantial portion of the market.

A lot of it has to do with the types of marketing techniques that are used. I am emphasizing more consumer research and the importance of the type of marketing strategy that has to be used to bring about greater customer acceptance, because often emphasis is placed just on a planning methodology or on the economic or payback considerations. All this other marketing stuff is usually imputed; it is not really looked at in much detail. Once decisions are made concerning the planning methodology that should be used in terms of least-cost planning, there has to be a significant amount of emphasis placed on the screening and evaluation of marketing strategies. The selection of marketing strategies has to be grounded on customer acceptance considerations.

Another finding in the United States is that there is a program life cycle. Participation levels in a utility conservation program generally start out pretty slowly; then they pick up and then they taper off. A utility cannot use the same marketing strategy in a program throughout the life of a program. It has to vary and manipulate the marketing techniques as participation levels increase. Utilities have to change their marketing mix as these programs are being promoted and as the marketplace accepts them.

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Typically, US utilities keep the same program. Programs have to shift over time. We have also found that a lot of times the participants in US utility programs are upscale. They do not represent a cross-section of the market that is available. Greater efforts have to be undertaken to bring in more of the middle-class and even lower-class market segments, because there could be an income transfer from lower-income people to higher-income people in these programs and it could actually work against what you would want a program to do.

Typically, US utility programs have been broadly segmented, and that is why participation levels are traditionally low. We found in consumer research studies that incentives can be very effective in bringing about greater market response. We also know there is very limited understanding of why people participate in programs.

I will now show you a behavioural model to reinforce the importance of consumer behaviour in marketing these programs. When somebody makes a decision to buy a refrigerator, a heating system or a cooling system, this is called a "high-involvement decision" in marketing research; there is a lot of risk involved, and people do not just automatically make these decisions. If a utility is going to start promoting demand-side options, it is going to start promoting big investments for residential home owners and for commercial and industrial decision-makers. People do not just make decisions; they go through a buying process. They go through a period of problem recognition. They start searching for alternatives. They evaluate the options that are available to them and then they make a decision.

There are four key phases to a decision, whether it is a consumer or business decision. The marketing choices I showed you earlier--customer education, direct contact and financial incentives--all can be more effective at particular phases of the buying decision. This chart reflects the importance of a utility having a much more sophisticated understanding of the buyer or the decision-maker. If we do not have a good understanding of this, we can continue with our limited knowledge of this process, we can invest all

the money we want in good technologies and use economic rationales for their being adopted in the marketplace, but we will fail.

Some utilities have been test marketing to have a better understanding of behaviour and of the penetration rates of demand-side technologies. The Hood River project was mentioned as an example. Right now there are about four utilities in New York state that are implementing test marketing programs. This is a design we are using for a utility in New York state--New York State Electric and Gas--to alter the marketing techniques in three different geographic areas, mainly to get a better understanding of the optimal program configuration. We want to know we are spending just enough money to get the maximum possible acceptance level for that demand-side program. If utilities are going to start spending more money on demand-side technologies, they are going to have to start doing more test marketing to optimize the design of the demand-side program.

I would like to get to the bottom line as we see it for US utility programs. Which US utility programs work? What are the attributes of successful programs? What have been the pitfalls encountered by US utility programs?

The demand-side programs that we found worked the best in the US were those that had top-level management commitment to them. If a demand-side strategy does not have senior management commitment, there is much internal inertia in an electric utility, which is typically a big corporation, that could easily undermine the program's success. The key focal point in bringing about an effective demand-side strategy, at least in the US, is to make sure there is top-level management commitment. In the US utilities that have had the greatest success in demand-side programs, top-level management bought into the notion that they were doing more conservation and were going to do more load management, a critical facet of demand-side management.

Another factor is strong regulatory oversight. We do most of our work with US utilities, and I would like to say that for the most part, many utilities took their own initiative in developing demand-side programs. It is clear that those utilities that have the largest expenditures and that have had the greatest successes to date in demand-side management are those that had regulatory authorities looking over their shoulders. I do not know what the implications of that are for Ontario, but in the US, regulatory authorities were very much involved in bringing about demand-side programs.

Also in the US, some utilities have a very strong local community presence. There are municipally owned utilities in the US, and a number of them with a strong local community presence have been very innovative in demand-side management.

Sufficient funding is extremely important. I have often seen utilities with great program plans, great concepts, well-designed programs, good energy-saving estimates and good present value, but they did not have sufficient funding for the programs to really make any difference. It is critical when a utility starts a demand-side management program to put up the money to give that program every opportunity to be successful.

The last factor that has been extremely important in the US is that government activity can go only so far to be effective in bringing about a utility's conservation program. I am talking about this from the US perspective. There are a number of examples where regulatory authorities have tried to push a utility to do conservation activity. They have not been

successful because the utility did not believe the program was in its best interest. There has to be some mechanism or process that allows the utility and government, if it is a government regulatory body, to come together and mutually discuss the supply-side and demand-side choices available.

If government authorities in the US mandate that a specific type of conservation program be implemented and that a specific amount of money be expended, but a utility does not believe in the program, the program is not going to happen. Regulatory authority in the US does not always achieve its objectives.

What are the attributes of a successful program? By and large, there is a good management structure for the program and a detailed critical path for it, almost like a road map. It should be possible to diagram a good, well-defined, successful program on a sheet of paper, as we sometimes diagram a project we have at home, say, if we are moving; every item has a location. The same holds true for a program, which has to be predictable. We have to have information requirements at certain key decision points. We have to know well enough in advance whether the program is achieving its objectives.

Creativity, brainstorming and consumer research are extremely important and have led to the success of utility demand-side programs. Negotiation and co-operation between central offices and field offices is extremely important. I would like to dwell on this just for a moment. Regulators, governmental bodies, often view electric utilities as monolithic organizations, but in a big electric utility there are many separate, independent organizations. If there is no top-level commitment to a demand-side strategy, and if there is no careful follow-through within the utility between the corporate management in the central office and the individual divisions out in all the little regional areas, say, in the province, then the program will break down.

To be successful in demand-side management, the utility has to sell that program to its own internal constituencies in the different divisions and sections of the province. I have seen many examples of utility program failures because of an inability to follow through with a program in the hinterland, in the outer areas. I expect that for any demand-side program initiative in any utility in Canada, there is going to be almost a natural expectation of this problem. The follow-through in working with the individual distributors is a real problem.

Sufficient program support materials: It is not uncommon to have a well-designed program but not enough aids and tools to help people in the field to implement the program. This is one of the areas most often lacking resources in US utilities. The Electric Power Research Institute is now trying to develop marketing handbooks and materials and is training marketing representatives to sell energy efficiency. There has been very limited investment on the part of the US utilities in the principles and concepts of selling conservation as you might sell office equipment.

10:50 a.m.

A defined monitoring and tracking system: One of the biggest issues in the Pacific Northwest has been how we are going to measure and document whether we are able to get that kilowatt or kilowatt-hour from the demand side in the same way as we measure volts going through a line. It is a real problem. A lot of money has been invested in the Pacific Northwest to come up with monitoring and tracking systems so we know there is a feedback effect to the power system from these demand-side programs. This is going to be a major

expenditure area, in addition to the marketing research, to make sure our demand-side programs are just as tangible as our traditional supply-side options.

I have said enough about marketing research. More successful programs have evidence of using market research at some point in the implementation of a program.

What are the pitfalls of US demand-side program activity? We feel the first is pretty significant, there being an unclear or contradictory relationship between the conservation programs and corporate goals and strategies. We think utilities often lack an entrepreneurial attitude or aggressiveness in promoting their programs. The more successful programs are going to be those that have people involved who are very aggressive in bringing about success in the marketplace.

No advance market research leads to failure. It is not uncommon in the US to see programs implemented without benefit-cost analysis completed. A number of utilities in the US have implemented conservation programs that have led to increased rates and not decreased rates.

Another limitation is not having a broadly based planning approach. Limited contact with trade allies and limited use of pilot programs are barriers that US utilities have encountered. Limited contact with trade allies is an extremely important factor. If a utility is going to promote an air-conditioning program or a heating program, it is extremely important to work closely with the heating-cooling contractors. If they believe in the program, they are the ones who will make that program a success in the eyes of the consumers.

How can some of these pitfalls be avoided? There is a need to develop an integrated supply and demand approach, a tangible planning methodology. The demand-side planning process has to be made more routine. It has to be identifiable and predictive. It cannot be the nonchalant kind of method that most US utilities have.

More pilot programs have to be undertaken to debug many of these new programs. We have to improve the management and recruitment of utility personnel who are responsible for implementing these programs. It is not uncommon to find people in the wrong position because of their background, experience and psychological profile. It takes a different kind of person to be responsible for the implementation and operation of a program as opposed to the designing of a program.

Process and impact evaluations have to be conducted. It has been said in some regulatory hearings that utilities should spend at least five per cent of a program's budget in monitoring and evaluating the performance of the program. There should be an annual planning process and formal reporting on the success of a program. I do not think most utilities in the US report formally on the success of their programs. They get the budget and spend the money on the program, but there is no formal reporting process on the relative success of the program.

Finally, and again extremely important, a utility has to work very closely with the outlying field offices for a program to be successful.

Let me present to you a couple of analytical charts in which I explain what I mean by bringing more marketing into programs. In the future we are

going to see a program represent a number of different marketing options and choices. We are going to see the cost and the price for that energy dictated by the resource capital of the utility. We are going to see such factors as performance, delivery, channelling, service and other marketing options all carefully calibrated and brought into that program. The program is going to have to be optimized to bring about the highest possible level of customer participation or to try to minimize program costs.

Resource capital structure reflects a mistake US utilities have made: they invested a lot of money in the supply side. The price a utility requests in the markets it serves is basically determined by its capital and revenue requirements. Some utilities are trying to market increased electricity sales because of a need to reduce the average cost of electricity, but it is very difficult for them to get large participation levels because they have already made decisions on the capital structure side that are going to dictate how much they can charge for that power.

Fully effective demand-side management is going to require that decisions on the resource capital side compete with decisions on demand-side marketing options. A utility that continues to do business traditionally by investing in large capital outlay projects, assuming those outlays as a given and then designing demand-side programs, is not going to have a fully integrated least-cost planning program. The resource capital structure has to compete with the demand-side marketing options.

In formulating a structured demand-side program, the utility first needs to define its objectives in the demand-side area. I do not see how a utility can hold people accountable unless it has a formal definition of what it hopes to achieve in the demand-side area. Second, the utility has to assess its demand-side potential. What is the total market potential out there from demand-side options? In addition, what proportion of that potential can be achieved through a demand-side marketing strategy? There should be demonstration programs or test marketing to check whether those assumptions are accurate. There should also be some modification or feedback in redesigning that program based on the results of the pilot test. Then the full-scale program should be implemented and a monitoring and tracking system developed for the program.

What is the future direction in US demand-side program activity? I have said some of this before. There is going to be a more careful bringing together of different marketing choices for a particular end-use market. Utilities are going to start offering multiple options to end-use markets through technology marketing strategies. We are going to see more formal and structured marketing plans that we can easily pick up and read and review to identify how much resource is going to be allocated to a particular demand-side program. We are going to see more advanced segmentation and behavioural research funded so we can come up with better estimates of market acceptance of a demand-side program.

We are going to see more current-day advertising and promotion being brought into utility demand-side programs, more rigorous evaluation and cost-effectiveness analyses and more regulatory oversight. In the US, I think there is going to be a continued increase in such regulatory oversight. There is going to be an infusion of nonutility marketing literature into the utility demand-side marketing area to help improve the capability of demand-side programs, more test marketing, more competitive information on end-use markets and more formal program-design approaches.

That is it.

Mr. Chairman: I assume members of the committee have some questions. Perhaps we could allow 10 or 12 minutes for questions and then move on to the next presentation. We can then reserve some time for questioning both witnesses. Is that agreeable?

Mr. Davis, perhaps you could take a seat at the table. It would save your trying to rescue that microphone, and it would be a little more comfortable.

11 a.m.

Mr. Brandt: I want to go back to the question you raised with respect to the significant dropoff in demand in Pittsburgh, which I think you said resulted in a 30 per cent to 40 per cent reserve capacity. Is there a target figure? I was listening through your presentation to see whether you would mention an average target figure that is deemed to be acceptable in terms of reserve capacity in the United States. I recognize that would vary substantially from one area to another, but could you give us a number that you think is right for the US utilities?

Mr. Davis: The industry norm is about a 20 per cent reserve margin. Until the late 1970s, probably a 30 per cent reserve margin was acceptable and not viewed as excessive. Now there is an emerging view, although it is not a prevailing view, that reserve margins could actually dip as low as 10 per cent and not significantly jeopardize reliability in meeting peak requirements.

The California utilities have some of the lowest reserve margins in the United States but, by and large, they are also highly respected and rank very high on Wall Street, largely because they have tried to restrict their capital outlay. On an individual utility basis, there is some merit in investigating the appropriateness of reducing reserve margins below the 20 per cent norm that is commonly used in the United States.

Mr. Brandt: If I might continue, I want to get into the situation as it relates to the major exporting provinces, out of Canada and into the United States. From your perspective, is the power that is being imported at present from Canada by American utilities looked upon as a short-term stopgap measure to fulfil some of the immediate power demands? Are these American utilities calculating and figuring into their calculations that this power from major exporting provinces such as Ontario, Quebec and Manitoba comes from a long-term, dependable point of supply and that they will, therefore, be continuing to purchase it over the coming decades? How do they look at it from the American side of the border?

Mr. Davis: Most US utilities view the availability of Canadian power as a short-term solution. What we are going to see emerge, however, with respect to imports and exports of power, is more of a long-term/short-term view of power. That means US utilities are under constant pressure to look for the cheapest source of energy available to them. It is not uncommon for a utility that has new generation to use bulk power or wholesale power that is available from a cheaper source.

I expect that US utilities will continue to use Canadian power on a short-term basis for as long as that power represents a cheaper alternative than the more traditional source of building a plant in the United States. There may be some exceptions in New England and the northern tier of the

United States, where Canadian power could be viewed in a long-term, firm power-purchase program, but I think that is more of an exception than it is in the current short-term view of meeting immediate needs for the cheapest source of power available.

Mr. Brandt: You are probably speaking of Quebec and the long-term contracts it is entering into with New York state and other states in the northeastern sector of the United States. From a Canadian perspective, and more specifically from Hydro-Québec's perspective, that would be a good business decision. It is an export commodity it can make money on. If the price is lower, I gather that the United States looks upon us as a stable, long-term dependable supplier and will continue to do business with us as long as the price is right.

Mr. Davis: That is correct. The other problem in New England and New York state is that it is very difficult to get the necessary authorization and permitting approvals to build a new base-load plant. If you talk to the senior management of one utility in New England, Northeast Utilities, the last thing they want to do now is even think about having to go through all that has to be gone through in the United States to build a new base-load generating facility. If they had their druthers, they would buy as much power as is available at a reasonable cost from other providers because it is a lot cheaper for them than thinking about building their own new base-load plant.

Mr. Polsinelli: I have a supplementary to Mr. Brandt's first question. Mr. Davis, you indicated that in the United States, the industry norm is to maintain a 20 per cent reserve but that figure can vary, depending on the individual utility. What factors would be taken into consideration in determining whether the reserve should be higher or lower for a particular utility?

Mr. Davis: The factors considered are the age of the existing generation mix, the reliability of the existing generation mix, the percentage of the time significant base-load plants are off the system and growth rates. If a utility is in a very high growth rate area and if there is a possibility of load inflation, it might be appropriate to consider increasing the reserve margins by adding more capacity. That contrasts to a situation where a utility may be subject to high construction cost and high inflation. The utility may forgo capital outlay during that high inflation period and let the reserve margin drop or slip a little.

The other point is that there is so much surplus power available in the United States, either from Canada or from other utilities that have the power to sell, that while a utility can show that its firm reserve margins may dip to 10 per cent and eight per cent, there is still going to be power available for purchase if the utility absolutely needs it, assuming the grid connections and the transmission systems are available. I am sure utilities in the US have done their contingency planning to investigate what they would have to do if certain parts of their systems were either overloaded or had a stoppage of service.

Mr. Polsinelli: Essentially, those utilities that are dropping their reserves to 10 per cent would be relying on a purchase option. If they were to need additional power, they would purchase it.

Mr. Davis: That is what they would be counting on if something happened that they did not anticipate.

Mr. McGuigan: I have a complicated approach to the matter of opportunities to conserve on heating loads, that is, opportunities in the United States as compared to Canada. It is more than a theory of growing crops in Canada; it is a fact that if you draw a curve of the intensity of sunlight, you get a bell curve peaking in July. There is a very steep rise from May to July, and the curve slides down very quickly in September.

In Canada, it is important that you plant a crop very early in order to have a leaf surface by July 1 that will absorb that high intensity, because it is going to drop off soon. If your crop does not peak until August, you are going to get a very poor crop because you are too late to miss the intensity. In Canada, we have a sudden summer as opposed to the US corn belt, where there is a gradual summer that starts in April and goes to October. Ours goes from May to September.

Is the reverse true in the southern states? You have a sudden winter that starts in December and ends in January. It gives you a very steep curve as compared to our gradual winter from November to April. If that is true, then it seems to me you have a far greater heating peak load in your utilities than we have. There would be more opportunities for reducing that peak and conserving during that period. I wonder whether that works out.

11:10 a.m.

Mr. Davis: I am not a climatologist. I wish I could answer your question about the climate assumptions.

Mr. McGuigan: It might be worth looking at.

Mr. Davis: I really do not know how to respond to your question, except to say that in the southern part of the United States where there is a lot of humidity and much need for central air-conditioning, there are some houses near the Atlanta, Georgia, area and in that whole line from Atlanta to Dallas that are being designed and built with two heat pumps, one for downstairs and one for upstairs.

The coincident peak impact is significant for some utilities. That is the main reason they are trying to improve their load factor by shaving the peak, by trying to make the homes and the heating and cooling systems more efficient. It does cut down that coincident peak.

Mr. Chairman: Perhaps the simple answer to Mr. McGuigan's question is that some utilities in the US have a summer peak rather than a winter peak. Of course, Ontario Hydro peaks in the winter.

Mr. McGuigan: You have to take into consideration that the cooling load in the southern states--and this factor is coming in actually in the flight of industry from the northern belts to the southern belts--is only about 40 per cent of the heating load. You do not have a reversal of those situations. Is that wrong?

Dr. Rosenfeld: No. I am sorry. I am Arthur Rosenfeld. As the chairman said, something like 80 per cent of American utilities are summer peaking. That means the summer peak is more severe than the winter peak. By the time you get down to Georgia, they just do not care. They would like to sell electricity all winter long because all they are doing is using some of their reserve margins.

Mr. McGuigan: Their peak is the opposite then.

Dr. Rosenfeld: Reversed.

Mr. McGuigan: Then my theory is--

Dr. Rosenfeld: Your theory is nicely irrelevant.

Mrs. Grier: We are often cautioned about leaning too heavily on comparisons with the situation in the United States. In your opinion, how much of the impetus for this whole trend can be attributed to the inadequacy, if that is the best word, of the nuclear program in the US as compared to the Candu program here in Ontario where our nuclear plants, while exceptionally expensive, have a greater reliability and efficiency than nuclear plants in the US?

Mr. Davis: Some would say that the cost of nuclear power in the United States is definitely uncontrollable. In my own area of Philadelphia, there is a plant still being built that was originally budgeted to come on line for about $600 million. Once the unit comes on line, it will end up costing $3 billion.

Mrs. Grier: How much does that kind of example contribute to what has happened in the United States on the demand-management strategy?

Mr. Davis: It is a contributing factor to the electrical utility industry in the United States being an increasing-cost industry. For every new plant that is added, especially if it is nuclear, average rates are going to go up substantially to cover the cost. That puts more pressure on regulatory bodies and utility management to look for ways to control the costs. Conservation and other forms of load management are solutions they feel will do that.

The problem is that many US utilities look at the demand side after decisions are made to add those nuclear plants. If they would look at the demand side before the decision is made to invest in nuclear capacity, they would be in a lot better position to evaluate the economics. They would have more favourable economics and there would be a better impact on their system than if they look at the demand side when the units have already been invested in and are almost ready to come on line.

Another contributing factor is that parts of the United States are experiencing very high growth in electricity use. In the sunbelt states, the growth area of the United States right now, we have the summer peaking problem, which results in low load factors for utilities or inefficient use of the capacity at some times. That, too, is bringing about the need to look for ways to improve the ratio of the peak use to the off-peak use of those plants. It is not only limited to nuclear power plants; it is also related to other forms of base-load generation.

Mrs. Grier: How familiar are you with Ontario Hydro? Are you in a position to comment on the kind of demand management it has done so far?

Mr. Davis: We did a study for the Canadian Electrical Association. It was to look at a resource-planning approach using different economic evaluation tools to evaluate three different demand-side programs. Ontario Hydro was one of the case studies of the project.

The project did not give us an opportunity or require us to investigate Ontario Hydro's demand-side planning process. What we were asked to do was very narrow and limited in the sense of applying and looking at specific evaluation tools for a given type of program. It did not involve us in or avail us of the opportunity to look into the demand-side planning process of Ontario Hydro.

Mr. Haggerty: To follow up on the question I raised before, in your experience do combined gas-electric utilities have an improved approach to demand-side management?

Mr. Davis: I would say no. I would not say that because they are a combination company, gas or electric, they have any better planning process than an electric utility. Very few notable utilities have actually attempted to undertake resource planning from the standpoint of having the gas side of the business compete with the electric side. The utilities that come to mind are San Diego Gas and Electric, and I think Pacific Gas and Electric is trying to do that. It is trying to stimulate gas sales in the short run because of the economics, but it is for an energy-efficient end-use application that it is promoting it. There are very few examples of US utilities that are combination companies that have tried to do comprehensive resource planning.

Mr. Cureatz: I have one quick question. Maybe I should bite my tongue, but the overall feeling I have from your presentation is of something that the New Democratic Party has promoted in some way. It is that the utilities should become more aggressive in finding out exactly where the power is going instead of building huge conglomerates and sending the power out the lines. The utilities should get out into the marketplace to see the usage, whether the power is being used properly or whether there are other ways of using it. Is it being more aggressive in knowing where it is going?

Mr. Davis: It is being more aggressive in knowing where it is going and to what extent. There are greater opportunities in identifying the source of energy at the end-use point than in starting far back in the supply-side chain.

Mr. Cureatz: Do you feel comfortable that it should be the role of the utility to do that instead of a state agency, federal government or provincial government stepping in?

Mr. Davis: No. the point I was making, although not directly, was based on the US experience and on facilitating a demand-side planning program such as has evolved there. The demand-side planning program as it has evolved in the US--using that as an example, and I will leave it to you to determine whether that applies here in Canada--resulted from joint regulatory oversight, regulatory intervention and utility aggressiveness in looking at the demand-side options.

11:20 a.m.

I also pointed out that even the California utilities, which are often held up as utilities that have been innovative and successful in demand-side management, did not willingly and freely go into this process themselves. They too went through an aggressive regulatory environment. You can say it is more intense in California because there are two competing regulatory bodies there and they do not always see eye to eye. The California Energy Commission is much more aggressive in wanting to see utility investments in demand-side options. The California Public Utilities Commission is more moderate in what

the utilities do, even though it has the largest conservation branch of any regulatory body in the US.

The message basically is that it involves both public authority oversight and utility involvement and dedication to bring about successful demand-side programs.

Mr. Cureatz: I have one final question. It would then lead one to think that instead of dragging the utility into a position of picking, it would be easier to implement such a program without intensive regulatory devices. What you are saying is that utilities, even those that have been innovative, have not been so out of the clear blue sky. Innovation has evolved over a number of years through regulations and concern and because of demand and supply.

Mr. Davis: It also takes place internally to the utility. Having an effective, successful demand-side program is an evolutionary process within a utility. I have worked in Pacific Gas and Electric and other California utilities, and I know a number of the problems they have had to bring about their conservation goals and strategies at the district level.

Some of the districts and divisions in PG and E view themselves as autonomous separate utilities. There is a very significant organizational problem that has to be dealt with within a utility to bring about these successful demand-side strategies, because a large utility represents many publics.

It is going to be an evolutionary process. That is why I am a little sceptical when regulatory intervention is sometimes proposed as the best and optimal way to bring it about, because utilities are big organizations. It will not happen if those utilities feel strongly that those measures are not in their best interest. That is why you need this joint planning regulatory or joint planning public agency and private utility approach.

Mr. Chairman: I believe Mr. Gordon and Mr. Sargent have brief questions.

Mr. Ashe: I have a brief supplementary, if I may.

Mr. Chairman: I have been very lax. I said 10 minutes and we have now gone 25 minutes. Bear that in mind. I hope you will bear with us on into the lunch hour. You can have your supplementary.

Mr. Ashe: Very briefly, Mr. Davis, I need a small clarification: Have you done any work on the demand side directly with any Canadian utility, such as when you were contracted to Hydro-Québec, Ontario Hydro, Manitoba Hydro or whatever?

Mr. Davis: No.

Mr. Ashe: Basically, the one assignment in Canada was the one to which you referred.

Mr. Davis: With the Canadian Electrical Association. The field work was done in co-operation with BC Hydro, Ontario Hydro and Hydro-Québec.

Mr. Ashe: What is your brief view of the relative problem--and I use the word "problem" because I cannot think of a more appropriate one--of a

utility to sell on the demand side, particularly in the conservation end, if its rates are one third those of another utility that has identical programs?

Mr. Davis: I do not understand the basis of your question.

Mr. Ashe: If there are two utilities doing the same demand-side program and are doing it effectively, efficiently, with management support and so on, but one utility already has a rate structure that is one third that of the other, do you think their relative successes will be comparable?

Mr. Davis: Probably not. We found that rate incentives are significant motivators for people participating in a utility's program, even though the utility might have rebates or other incentives that are available. The energy cost is a significant motivator in getting people to participate in a program and to invest in other conservation measures. There is no doubt about it.

Mr. Gordon: You mentioned behavioural market strategies and related that to specific technologies. Could you expand on that a little and give us an example?

Mr. Davis: An example is the three projects we are currently involved in. One is a consumer survey for the Electric Power Research Institute, which is to come up with a national sample of US residential home owners and identify the key market segments for six different residential energy markets: heating, cooling, water heating, refrigerators and a few others. What we want to do is develop a model that allows us to predict the participation level in a program if that program has certain characteristics: a rebate of $50 versus one of $35, a low-interest loan or what have you.

Again, the important point is, in doing a cost-benefit analysis, participation levels are often imputed. We need to estimate better the market segments that are out there and then come up with a program that is reflective of the needs and desires of a segment so we can maximize the participation level in that program. There are a few individual utilities that are doing this on their own right now. It has to be done if utilities are going to spend a lot on demand-side programs. If they do not start segmenting their markets, they are going to waste money.

Mr. Sargent: Mine will be a very quick question. I expect a yes or no answer.

Mr. Chairman: All right.

Mr. Sargent: I would be interested to get your opinion on power generation costs, since you are a US authority.

Mr. Cureatz: How is that a yes or a no?

Mr. Sargent: Without reckoning the burial or destruction costs, which are unknown in nuclear power, the Financial Times of London gives this scale in reckoning electric power generation costs: uranium 40, coal 20, oil 10. How do you go along with that, bearing in mind that we do not know the dismantling or burying costs or what we are going to do with the waste?

Mr. Brandt: Do you want a yes or a no?

Mr. Sargent: I am helping him out.

Mr. Davis: I have no opinion. I am not an expert on that, nor do I know anything about the cost of burial.

Mr. Sargent: Does this scale of 40, 20 and 10 sound realistic to you?

Mr. Davis: I have no basis on which to evaluate whether that is accurate. I am sorry.

Mr. Chairman: Thank you, Mr. Davis.

Mr. Rosenfeld is our next witness. Members of the committee have a brief biography in front of them and a brief description of his subject, but I draw to their attention that on April 28 Mr. Rosenfeld will receive the Leo Szilard Award of the American Physical Society for Physics in the Public Interest. It is an honour he has earned as a result of some rather remarkable success in research and development at the Berkeley lab in the whole area of energy efficiency.

We are very pleased to have him with us.

11:30 a.m.

DR. ART H. ROSENFELD

Dr. Rosenfeld: I am also very pleased to be here to see if some of our American experiences over the past traumatic 10 years can be of some use to you.

I will go through my transparencies. You have copies. On each transparency I give the page number which goes along with your copy; so you can take notes if you want. I am very happy to be interrupted, and I will notice what time it is.

Mr. Chairman, you should tell me what time you want me to be through, so I will not interfere with your gastric juices.

Mr. Chairman: I am quite sure you will have the indulgence of the committee to complete your presentation and allow for some reasonable time for questions. Feel free.

Dr. Rosenfeld: All right; thanks.

This first transparency defines the field in which I claim to know something and the area in which I claim not. I do not know much about marketing. I am a physics professor. I have done a large program at Berkeley, two thirds paid for by the Department of Energy and about one third by utility programs. It is our job to develop better technology, computer programs and databases for energy efficiency.

In principle, I would not get into the field of utility programs at all except you very quickly learn--and Todd Davis would emphasize this--that you can have fine technologies, but if nobody realizes they are cheaper than installing more generators, it does not happen. Therefore, you do have to worry about delivery programs a little bit and about such things as big debates on labelling appliances and buildings and that sort of information program.

At Berkeley, though, we have a group that knows about the energy

performance of whole buildings, ventilation and indoor air quality. We develop better and more efficient lighting and windows. We develop computer programs with which you can design residences and commercial buildings, and we try to keep an up-to-date, cost-effective database to show what works. All that now adds up to about 150 people working and a budget of about $15 million a year.

I will give a small context about where I am coming from in terms of my personal views. I will illustrate with this prop, which may look a little scary, but it has two points on it that I would like to make. The first one is, what are these snakes on here with their heads all in red? To the right is national income per capita in US dollars. It shows Canada with a national income per capita of about $12,000, and vertically--on all my transparencies, energy will be vertical--is energy use per capita.

In the old days, people had an idea that as gross national product increased, energy use would have to increase almost inexorably. In fact, if you look at the US, which I am most familiar with, between 1970 and 1979, when energy prices really went up, what happened was that GNP went up slowly, and energy use went up accordingly. Then all the improvements in technology began to be accepted rapidly in the market as the second oil shock came along. The GNP quit growing and energy use went straight down. We see that is the pattern in all countries. Practically all the trends now are straight down; that is, not a lot of economic growth and a hell of a lot of improved efficiency. The name of the game is to get as close to the bottom as possible.

I have three comments about Canada. First, Canada does not look as though it has a lot to be proud of in this race for efficiency in the sense that these lines of five per cent, 10 per cent and 15 per cent of GNP are based on international average prices--actually, US prices--for electricity. They show that the US was at 13 per cent of its GNP, but it is now spending only 11 per cent of its GNP on energy services. We think that is good. We have gained two per cent, which can go into other productivity.

Canada seems to be stuck at about 15 per cent, along with only the Soviet Union, Poland and China. Our real economic competitors are quite a way ahead of us. Here is France hitting seven per cent and Japan hitting about six per cent. That means every Japanese car or whatever you buy has roughly a six per cent advantage over the US in terms of the cost of doing things, because the Japanese got their energy services by investing in efficiency some time ago rather than burning a lot of oil.

Where am I coming from? My aim in life is to get everything coming down as fast as possible by whatever tricks we can find. The green line here, which I will comment on, is simply to show--

Mr. Ashe: May I interrupt?

Dr. Rosenfeld: Yes. I like to be interrupted.

Mr. Ashe: For clarification, when you are talking about those percentages compared with the GNP in each case, are you talking about dollars or utilization? I am trying to get the relative comparison of Japan with the US, for example.

Dr. Rosenfeld: I am glad you brought that point up. This scale is labelled in energy use per capita, and it is resource energy use per capita, which until the recent plummet in oil prices was very close to $6 per million BTUs all over the world, including electricity, on those scales. That is all I

did; I took $6 per million BTUs. In the case of Canada, if I took your cheap electricity in mind, four cents a kilowatt-hour or whatever, Canada would come down a little bit.

Mr. Ashe: That is what I wanted clarified.

Dr. Rosenfeld: You made a good point there.

The green line is there because in a little while I will get to some discussions about what we learned from a big study in 1980 called the Solar Energy Research Institute conservation supply study. I will show where that fits in here. In a little while, I am going to get around to saying something five times and you will get bored. I am going to say that every study we have done for the past 10 years has shown that the conservation potential, the least-cost scenario--I am not saying you will get there; it is not a forecast --is always to get your energy costs to about half of what you are spending at the moment.

In fact, this study was done in 1980 and it said that by the year 2000, in 20 years, we should be able to grow the accepted amount--conventional wisdom--but we should get our energy use down to this point. In 1980, that prediction was so controversial with the Reagan administration that the report was actually banned. However, we are a third of the way there. We have 17 more years to do it, and we will clearly do it. People's ideas about energy efficiency change rapidly with time. I will get back to that.

How did a nice physics professor like me get into this rat race? Perhaps the interesting thing about it is that it dates back to some hearings, much like these, in 1975. California had just decided to put together the California Energy Commission, which Todd Davis mentioned, and it was wondering what its priorities were. I argued that its priorities were to put a lot of attention on end use. There was a big debate in the state about how many power plants needed to be sited starting in about 1975. It is interesting to see what happened.

We had been growing--this is peak gigawatts, each gigawatt being a nominal power plant--at a rate of six per cent a year; then there was an oil embargo and most of the plants were burning natural gas. The price of natural gas went up and the utility said, "Oh dear, with the increase in gas prices, maybe the rate of electricity growth will decrease to five per cent a year."

11:40 a.m.

I had been studying buildings for about a year by then and had observed that it was often cheaper to turn out the lights than to buy more electricity. I came up with this idea of conservation potential--if you got your act and your investments together--and said that probably all the building services we needed could be supplied with about a one per cent growth. I looked into the industry a little bit and it looked about the same, one per cent per year; so I came up with the idea that probably California could, if it wanted, get along with 1.2 per cent growth instead of five per cent growth.

The electric utilities in California were mad as hell. They complained to the president of my university that I was thoroughly unequipped to make such wild comments. What in fact happened is the purple line. We have not succeeded in staying as low as the one per cent theoretical potential, but we have been a heck of lot closer to it than to the five per cent per year growth. What have we not built? We have not built five fossil plants, five

nuclear ones and a couple of dams. Over the past few years, as the presidents of the same utilities that tried to get me fired have recognized it was not very easy to raise the capital for those five nukes, five fossil plants and two dams, they have come around to realizing that perhaps it is cheaper to supply energy services through improving efficiency. We are all now on good terms. I guess this reiterates Todd Davis's point about pressing on the utilities a bit in the early days: They do not like it, but in the long run it may not work out so badly.

The irony of this is that, practically on the same scale, here is Pacific Gas and Electric's 1984 plot of roughly the same peak demand. You will see that five per cent has long ago been banned from their vocabulary. The one I showed you previously was for the state as a whole. Therefore, there is a difference in scale of a factor of two. PG and E has about half the market. There are about 10.5 million people living in its service territory. Therefore, it is not so different from Ontario. PG and E says that given current trends in prices, it has a capacity today of 16 gigawatts and 20 years from now it will need 28 plants at 2.8 per cent per year growth. However, the people at PG and E say they can save. What are the areas in which they can save?

The first area, which cuts them down to a need for about 26 plants, is mandated conservation standards. I want to emphasize that this is very relevant to this discussion, but it is not what you have been asking Ontario Hydro about because it consists of California tricks such as appliance standards, building standards and little rules. For example, in California you cannot have electric heat unless you convince the official that is the cheapest way to heat your house over its life cycle. These are things you cannot necessarily expect Ontario Hydro to be trying to convince you of.

The next band is the sort of thing you have been discussing already. It says, "Sponsored Conservation and System Improvements," and that consists of incentive programs to try to get high-frequency ballast into lights such as the ones in this room so they will be more efficient and so on.

Finally, there are the load-management issues Todd Davis talked about a lot, which will save peak power but not necessarily kilowatt-hours. Of course, that is a very effective thing to do. When they get through with all that, PG and E says, "We think we can get along with 1.6 per cent growth per year and with having to build only the difference between something like 16 and 22 power plants in the next 20 years." In fact, its secret hope is never to build another power plant in the whole 20 years, which I will show you in the next flop. It is not exactly in the next flop but it is coming up.

This is a small side trip to ask whether all these aggressive California plans really work. They certainly worked in getting the attention of the Public Utility Commission of Texas. This is a plot for the six years from 1977 to 1984 of the difference between California and Texas. I picked these two states because they both have the same price for electricity. They are both rapidly growing sunbelt states. Texas is actually growing one per cent faster than California but the differences here are a lot more.

The difference is that California now is very happy with its conservation programs. California utilities plough back three per cent of their gross into conservation programs. Texas is a very laissez-faire state that until recently did not believe in all that nonsense in many ways. Texas is the last state I know of in the United States where you can still have an open liquor container in your car and nobody cares. They treated conservation

in roughly the same way, but it cost them a lot. You will notice that over the past six years, the Texans have had to build 11 new power plants to take care of their demand. The Californians have built three power plants. The difference is seven power plants representing roughly $20 billion. Now the Texans have decided that maybe it is time to get their act together, and I think it is.

The shocking story with Pacific Gas and Electric is its resource plan for the next 40 years. The white bar at the left is 1983, the dashed area is 1994 and what shows up in black is 2004. PG and E is still investing in about two plants' worth of hydro, a plant's worth of geothermal and easily two plants' worth of cogeneration. That is why I was able to remark that it only needs about six and does not want to buy a lot of conventional plants any more.

Diablo Canyon nuclear plant just came on line, but it will be the last one for a long time. When you look at oil and gas and the conventional steam plants, you will notice the shocking fact that none is planned and they will to go down as PG and E retires old plants in the next 20 years.

"Unspecified" means it is looking at more conservation. At the moment, there are no teams in Pacific Gas and Electric territory acquiring land, studying new plants or doing anything in the way of new supply. It finds it is easier to invest in conservation. That is a shocking comparison with what I see around me here.

These plants are known as "merlins." As you will remember, Merlin was a magician who sometimes appeared and sometimes did not. It is not clear which way it will go now, but PG and E is paying us to study what it calls "conservation power plants," and I will get to that in a minute. We were paid a certain amount of money to show PG and E how to save one gigawatt. For that amount of money we came up with plans at less than the current cost of energy for saving 2.7 gigawatts, so it is pleased with that study. There is still a lot of fat to squeeze.

I want to emphasize the size of PG and E's program, particularly for Mr. Sargent, who was asking about it. This information is from PG and E's conservation summary for the public utilities commission about a year ago. I want to emphasize some of the things that go into these programs. I am sorry this is now a year old. It says 1983. I did not duplicate the latest one, but it has not changed much.

Under "Energy Conservation and Service Programs," residential conservation audits amounted to $39 million. Home appliances and systems: PG and E has various rebates. If you buy a refrigerator that meets the California appliance standard by better than $5 a month in utility bills, you get a $100 rebate. Actually you do not get a $100 rebate. The salesman gets a $50 rebate and the owner gets a $50 rebate. This is known as "constructive rebates" and adds up to about $10 million a year.

PG and E will actually pay you $50 if you want to get the second electricity-guzzling refrigerator out of your basement and give it to charity. You get $50 and you also get a charitable deduction. That may save an unwitting family $1,000 in the life cycle of a refrigerator before it finally poops out. In that way, PG and E knows it will not be on at peak power times. It is a very good investment to save 150 watts for a $50 investment. That is the sort of thing we do.

The next big one is commercial, industrial and agricultural conservation

services, $65 million. Mr. Sargent, that is an example of what goes on, as you were asking Todd Davis. It is simple. PG and E says: "We have building standards that will allow us to predict a certain peak power in new buildings, but if you will design your building better with thermal storage, with high-frequency, high-efficiency lighting or with a better control computer, we will pay you $300 per kilowatt saved, cash, no questions asked except the questions in going over your plans; that is it."

11:50 a.m.

The $100,000 is just a limit per customer per project. It is not even that; it is a limit per building. PG and E figures that $100,000 is enough to get people's attention in planning the building. After that, it goes on and use its scarce money on other buildings. Basically, it is $300 per peak kilowatt and the answer is simple because it is a hell of a lot better to buy megawatts for $300 than it is to buy real watts for $1,760, which is the current planning answer. Therefore, everybody seems to be happy. All those direct programs added up to $123 million in 1983.

Then we get on to things that are called "other." Research and development on conservation, apparatus and controls was $3 million, load-management R and D was $40 million, cogeneration R and D was $40 million and so on--another $150 million. The total on this page is $270 million. I repeat, that is 3.5 per cent of PG and E's intake. PG and E says it thinks that program is roughly seven times as cost-effective as building new plants, and every factor of seven in this game helps. I have tried to be a little more detailed about your question.

I want to show you the next couple of transparencies because they give a bit of feeling for two things: one, what sorts of things one can do; two, what is the long time scale and why, even if you think you have excess capacity until 1995, 1985 is not too early to get started. There are two morals here.

This early one is a plot that says "May 1977." It is a thing a graduate student of mine and I produced for the California Energy Commission with two points on it, adding up to a recommendation that we should have appliance labels; not even standards, but labels.

Let us look at the top of the plot. Every dot is a refrigerator that was on sale in the Bay area in 1977. Three phone calls to three dealers gave us an average price of $420 retail. It used 120 kilowatt hours per month, which at today's price is about $100 worth of electricity per year. There were no labels in those days. You have energy guides so I am complimenting you, but I am saying to keep up the good work.

Mrs. Grier: What about jettisoning?

Dr. Rosenfeld: That is why I am making this point, but thanks for the comment.

In those days, there were an equal number of refrigerators like this lemon--I guess I should have used yellow for lemon and red for danger--which were the same price but were using $200 per year. Incidentally, refrigerators last 20 years. Therefore, the life cycle cost of the first one is $2,000. The life cycle cost to run this lemon was $4,000. There was no difference in the selling price because nobody had a way to tell. These were selling, thank you, just as well as those were. That was enough for the Legislature to realize that, without labels, there was no correlation between price and sales and

that was not fair to the customer, so we passed the California labelling laws and went on to have appliance standards.

As for the standards, which have also been successful, the point I would like to make is that in 1977 it was already perfectly clear that one could come down this steep path by making improvements in refrigerators and increasing the first-cost retail price of the refrigerator by something like $50, while saving something like $2,000 over its 20-year lifetime, and that would be a good thing to do. All that has come to pass.

We were recommending in 1977 that we go to 60 kilowatt-hours per month, which is 720 kilowatt-hours per year. Where are we going to be, not in 1977 but 15 years later? This is from the California Energy Commission. This is our experience in ratchetting down refigerator standards. We started with a limit of 150 kilowatt-hours per year in 1977, the first year of the standards. Every few years, as electricity prices go up, we tighten the refrigerator standards, always being careful there are a few brand names from each manufacturer still saleable so they can continue to stay in the market, although they have a lot of excess that they jettison in less wary places, such as Texas or perhaps Ontario. Gradually we will get down to 700 kilowatt-hours per month by 1997. It takes a while to get these institutions into progress, to learn how to do it, to knock down suits by unhappy manufacturers and so forth. You have to get into training 10 or 15 years earlier. That is part of the moral to this story.

What about cost-effectiveness? The state of California says the total first-cost improvement to go from this energy hog to this is $100 retail. It is actually about $35 wholesale, but there is a certain amount of advertising and marketing that has to go along with all that. That $100 retail pays for itself in savings in one year, which means that for the next 19 years the citizens of California will be laughing all the way to the bank.

Let us look at the power plants, in this case in all the United States. If we were still stuck with these inefficient 1950 gaz-guzzlers, we would have 47 base-load power plants in the United States doing nothing but running inefficient refrigerators. By 1997 we will be down to 18 plants. That is a difference of roughly 30 power plants at one gigawatt or $2 billion each that will be unleashed to do more productive things than heating your house indirectly via running the refrigerator.

There are still certain dinosaurs in the United States who believe that having power plants is in some sense evidence of economic productivity. Having a few excess power plants is great evidence of economic productivity. You need them so you can lure new industry to your state. Having 30 excess power plants is an example of economic stupidity. This is certainly a better way to do it. When you look into equipment and find there are a lot of things that you can do, then you ought to do them and you ought to kick industry and the other systems until they do them.

The next slide is an introduction to the concept of the cost of conserved energy. This is a plot taken from the Solar Energy Research Institute study that I told you about. It is called the SERI study because the money came from SERI. It turned out to be a conservation study. The total impact of solar was so pitiful that we did not make a big point of it. It said that if you do a least-cost scenario, you find out that even though conventional wisdom shows fuel use in the United States coming down a little, the economic optimum is at about half of conventional wisdom at the time. Conventional wisdom showed electricity use going up but the least-cost

scenario came down at about half that. This is the famous difference of 200 power plants that we talked about.

How do you move from one methodology position to another? I want to talk about this for a moment. The methodology we developed was to produce what we call a "conservation supply curve." An intermediate comment: where does the term "supply curve" come from? It is fairly obvious. "In the supply side" is what supply curves meant. A typical thing from a textbook correlates production of coal per year and price. As the production rate goes up, you use up the good mines and you go on to the more expensive mines and the price of coal goes up.

As you start insulating a house, at first there are very easy things to do that cost nothing, such as turning out the lights. Then you insulate the attic and that is cheap. Then you insulate the walls and that is more expensive. The cost of conserving a BTU or a kilowatt-hour may go up, but you want always to do those things that are cheaper than buying the BTU or the kilowatt-hour.

12 noon

Let us look at a conservation supply curve to see what it consists of. Here is a typical one from the SERI study, a book this thick and full of supply curves. It says, "Year 2000 Supply Curve of Conserved Energy...for Electric Appliances." What are the things one can do and what is the cost of doing them? The whole bunch of things in this example have to do with refrigerators and freezers. That is why I want to point first to this supply curve. You can get the manufacturers to put in better insulation and a little bit more copper at the back so the heat exchanger works better. You can get the manufacturers to start buying conventional motors instead of what they used to do. It is interesting that from 1950 through 1960, no manufacturers of refrigerators bothered to use conventional motors because they discovered they could make super-cheap, super-inefficient motors on their own. One thing was to get them to drop that and buy regular motors.

By doing that, you find that the extra cost of the refrigerator annualized over 20 years, divided by the savings in energy, gives you costs of less than one cent per kilowatt-hour for the better refrigerators. If you can buy power back from the home owner for one cent a kilowatt-hour, why the hell should you go out and manufacture it for four cents a kilowatt-hour? That is the unit of currency which we use, the cost of conserved energy. If it is cheaper than the cost of new energy, then buy it from the home owner.

Here is how you hang a supply curve from conventional wisdom. All our Solar Energy Research Institute report methodology was based on the assumption that there would be no improvements in efficiency but there would be increases in office stock, homes and so forth. That would predict how many billions of kilowatt-hours you would need. Then you would take this supply curve, hang it from here and say, "We will invest up to this conservation supply curve, up to the current price of electricity," which in Canada would be four cents a kilowatt-hour. That is at what we ought to buy it from the home owners. Beyond that, sure, we will have to buy power plants. That is the methodology.

That does not make it easy to compare with the economic forecasts which Ontario Hydro will do for you because these econometric forecasts are much more vague and they cannot tell you, nor have they any obligation to tell you, what fraction of these things has been acquired in their plans. They know refrigerators get better with time anyway. We put that into our curves in a

vague way. However, it is hard to relate the two. Do not expect too precise a relationship between the supply curves and the econometric curves.

One small point that I will make here, however, is the following. In the SERI report, we had to assume that a real discount rate was what the consumer and the building owner had in mind. Actually, we assumed that home owners did not have a lot to do with their money, that they were not as able to go out and make business deals, and so their real discount rate in real dollars was only three per cent. We assumed commercial buildings would require 10 per cent real return on investment. However, we all know that in the absence of information, people do not work that rationally. People will sometimes buy a refrigerator which has only a three-year payback and that is as far as they can trust the delivery system.

We took all these options, once they were in a computer, and asked, "Look, how much of the savings could we get if we went all the way to a 30 per cent real discount rate?" That is a poor man's way of not having to do a computer run. What we typically discover is that if you invest a certain amount and save 200 power plants, even at a 30 per cent real return on investment, you still ought to get about half of those returns back. This is some way of trying to compare the real world with the theoretical world and seeing that there are still good buys out there at a three-year payback instead of 50 years.

Our next venture was to work for the Bonneville Power Administration. I have a slide which shows the same database which appears in Hydro's testimony, and presumably everybody is happy with it. We looked at the BPA residential sector. It says here, if I have written it down correctly, that we studied 360 possible measures--better refrigerators, better freezers, more insulation, more efficient lighting, clock thermostats, all the sorts of things in the residential sector that might make sense--and discovered that if you went out to four cents a kilowatt-hour in BPA territory, you would save 50 per cent of the electricity it was using at the time. It is not 50 per cent of the 20 year forecast, but 50 per cent of the electricity which it was using at the time. This is the same database in which Ontario Hydro says it compared its predictions with BPA. Everything agrees reasonably well. There are lots of power plants out there. With 35 terawatt-hours per year, about seven-gigawatts, base-load plants are saved for the Bonneville area.

Texas has pretty much the same experience. Slide number 18 shows what we found by investing out to the current price of electricity in Texas in terms of saving energy. This is what its frozen efficiencies are predicted for 20 years from now and this was our cost-effective scenario, about a factor 2. It always seems to be about a factor 2. Incidentally, the reason it will be a factor 2 for a long time is that as things become well recognized, they work their way into this curve and become accepted as part of conventional wisdom. However, other tricks always appear across the horizon because as energy prices go up, people keep on developing more efficient ways to run lights, cool their food, wash their clothes or whatever.

Mrs. Grier: What does frozen efficiency mean?

Dr. Rosenfeld: Frozen efficiency means that in making these assumptions, to have a base line, you assume that all new houses for the next 20 years are built with the efficiency that is the standard use of today's house. Then all the calculations are made on how you improve over today's standards. Thanks for your question.

The peak power is roughly the same. The potential always seems to be a factor 2.

To give you some idea of what is in the works in the way of better appliances, both electric and gas, this is taken from a report by the American Council for an Energy-Efficient Economy. It is just a snapshot as of 1985 in which you can see things potentially coming down with time. The very left dot is 1985 unit energy consumptions. That is what language goes. That is today's efficiency. The next line is about today's new stuff, which is always better because the older refrigerators are wearing out and being replaced by the newest thing on the market. The best thing on the market today, in 1990 advanced technology, means things that are either going into production in the United States or are already for sale in Japan. We have two different criteria. They are already for sale in a competing country or we know they are going into production today.

We see space heating and gas appliances going from 65-per-cent-efficient furnaces today to some sort of condensing furnaces and maybe condensing furnaces with solar preheat. Water heating efficiencies go from straight gas water heaters today, to heat-actuated water heaters, which are beginning to come on the market in Japan. Let us look at the real big ones in electricity. They seem to be central air conditioners. Look at these efficiencies, coming from a typical 3,500 kilowatt-hours for a three-ton unit down to less than 1,000 kilowatt-hours, as efficiencies go up. Water heating with heat pumps is the same way.

In the United States, one year's new sales of appliances today, which are these second-tier black lines, require six gigawatts per year of new power plants. A few years from now, when people are buying the advanced technology, those six power plants per year will drop to about two power plants per year. That is another reason for pushing advanced technologies.

Mr. Cureatz: What do they do? Do they build the two power plants?

Dr. Rosenfeld: They are counting on building the two power plants, or at least they are beginning to think of it. That is Todd Davis's message. You have to look ahead a little bit. You have to try to get a few more appliance experts and building scientists on your staff and not rely entirely on economic projections.

12:10 p.m.

We recently did a study for Pacific Gas and Electric Co. in which it asked us to look at residential savings. This is the residential conservation power plant that I was mentioning to you. For PG and E alone now, these are the unit technologies multiplied by the number of sales in PG and E land in the next 20 years. We see that base air conditioning peak demand today in PG and E service territory is three gigawatts, that is three plants, for air conditioning. However, by the year 2000, if PG and E gets in mind to push sales of the technical potential, we will be down from three gigawatts to a little less than one, thereby saving in PG and E territory more than 2.3 power plants just in air conditioning. PG and E territory is the same size as Ontario, but you have a winter peaking and not a summer peaking problem, so you have to use different analogues.

This is a summary of the PG and E report entitled Project Merlin--Residential. We only had resources to look at PG and E's seven main end uses. Maybe I could talk about peak power just because I can talk in

megawatts and you can visualize it a little more easily. Today, PG and E uses 3.7 gigawatts in the commercial sector. By 2005, it predicted it would use 5.8 or 100 per cent on this plot.

We predict that with current technology, just pushing the best we can do now will save 1.8 power plants and get down to four. By keeping track of the potential technology, we could get down to 2.5 for a saving of several power plants. When he saw this report, the residential program manager for PG and E was so pleased that he went out and bought himself two photographs of virgin forest taken from a helicopter. They are on his wall now, one labelled "Merlin Site 1" and the other labelled "Merlin Site 2." The hopes are PG and E will never put power plants there.

Mrs. Grier: He works for a utility?

Dr. Rosenfeld: He is a utility program manager.

Mr. Chairman: You talk about keeping up with the technical aspects. That sounds a bit loose when you put it in the context of a 15-year lead time for a power plant. It just sounds as if it is leaving a lot of loose ends and if, ands and buts.

Dr. Rosenfeld: That is a very good point. Let me see if I can address it for a moment. One very important thing is to make sure you get efficient equipment into a new building because when you are building a building it is pretty cheap to make a decision, let us say, to put thermal storage in it. Once the building is built and is going to be there for 50 years, it is a lot more expensive to try to retrofit it.

For example, in California today a big use of the $300-per-kilowatt incentive I mentioned to you is to try to get designers of new buildings to put thermal storage in the basements of their buildings. That means to dedicate enough stuff for chilled water tanks or ice storage so they do not have to run their chillers in the middle of the day, but can simply recirculate the cool that was stored the previous night when electricity was in surplus.

That is a pretty good example of a long lead time affair because you have to convince the building owners to do it today, but the building owners are a little skittish about doing it today because there is not a lot of engineering expertise out there. As a result, the record has been spotty. One building will do it and it works fine and is well-designed. The next building will be the first attempt by some other engineering firm to do it. The firm will not do a very good job and there are a few horror stories out there. People are saying, "Sure, it is a good idea but why do you not try it first?"

PG and E can come in with its incentives, some guarantees and some consulting and it will take three or four years just to get case histories that people can go to look at. We are working on the data base to show who does a good job and a bad job. Then you still have to get them in place. Fifteen or 20 years from now it will make a big difference whether two thirds of the buildings built starting in 1987 had storage. That is the sort of longish lead time required. Does that roughly answer your question?

Mr. Chairman: Yes, I guess it does. I am trying to deal with the uncertainties of the demand-side option versus the relative certainties of the supply-side option.

Dr. Rosenfeld: Yes, and you really have a very good point. If you are willing to pay extra for the real certainties, you can install new peaking turbines at $1,760 a kilowatt. If you are willing to take a bigger risk or have a certain number of your staff consulting on thermal storage, you can get thermal storage for $300 per kilowatt. That shows that Pacific Gas and Electric should have 300 good engineers out there giving free or cheap advice on how to get thermal storage in. In the long run, that is cheaper than having 300 engineers buying up land for power plants.

Mr. Chairman: It comes back to the commitment of resources and management.

Dr. Rosenfeld: That is right. Let me repeat large numbers: A gung-ho American utility such as Pacific Gas and Electric or the Tennessee Valley Authority might have on staff 1,000 residential auditors, 1,000 commercial auditors and 300 design engineers out there getting these jobs done. I do not know what Ontario Hydro's resources are in that direction.

Mrs. Grier: Reverse the numbers.

Dr. Rosenfeld: These are major efforts. There are serious commitments by these utilities that it is the cheap way to go, but it does not happen by magic. It happens through hard work.

I am concluding with an offer. We might be able to have a bit of collaboration. The federal government of the United States has passed the so-called least-cost planning initiative, for which $1 million has been appropriated--and it is supposed to be a $4-million appropriation spread over three years--for improving the effectiveness of least-cost studies in the United States.

I have drawn a standard utility planning box and tried to indicate where some of these extra resources might be put. Utility planners these days say, "We look at conservation options on the right and at supply options somewhere on the left." In terms of demand forecasts, we have to take conservation options, which are engineering data bases--that is not so hard--calibrated by the other data bases, and combine them with information on the stocks, flows of data and forecasts on how many buildings or factories will be built, etc., and come up with a demand forecast.

As I have said for the last 20 minutes, that can be influenced a great deal if you know what is on the horizon in thermal storage and better refrigerators and lighting, and if you get together with the utilities who know the growth forecasts in their territories. One idea is to greatly improve the demand forecast, and the other idea is then for the utilities to get together with the Electric Power Research Institute and the laboratories to see if, given better supply curves on the supply side and on the demand side, they can really integrate this problem, because supply curves are still not the answer. They tell you the potential for saving peak power and for saving kilowatt hours, but that does not all get moulded together. The moment of truth is when you compare that with a choice of peaking turbines and base-load plants.

Then there are all the utility programs and experience Todd Davis was talking about. Suppose you really want to get more efficient refrigerators on the market; how do you do that? Do you bribe the salesman, pay the consumer, or does it turn out you pay both? Suppose you want people to build more efficient homes; how do you get them to do that?

We have a big debate in California. We first tried to put energy guides on homes and that turned out to be terribly cheap and effective. For $10 million, we got 200,000 energy guides on homes--I guess you call them Energuides here--in a few years in the Bay area. It resulted in a 10 per cent decrease in utility bills for homes in the United States in a few years, which is a pretty remarkable return on investment, but it did take $10 million. It was not just a do-good program. That worked out very well. Behind that come the somewhat easier mandatory programs, which we call our title 24 mandatory building performance programs.

The name of the game in California is that you have fairly loose building standards, and then the utilities go out and try to beat the game by giving incentives to beat the standards. That is how all that might go together, and you need a data base of how those things are done.

12:20 p.m.

I hope there will be a possibility for at least informal collaboration on that big project between Ontario, where you are really interested in this, and the United States, where we are really interested. I hope a possibility will be to get visitors from a number of interested areas to spend some time at one place, probably in Berkeley. We hope to have Japanese experts on refrigerators and maybe Ontario experts on heating houses. Put us all together and see what shows up.

Mr. Chairman: What is the climate like in Berkeley?

Dr. Rosenfeld: In the winter it is really very nice. The average winter temperature is 55. It snows once every umpteen years.

I would like to stop. I guess I am not going to show the last transparencies unless there are questions, but I have one that I would like to show. You can feel good that I have skipped all except the last two.

This is labelled page 25. I told you that data bases keep figuring into this. We have building standards in California, and utility planners may be too naïve. They may say: "Okay, we have building standards. Now all new buildings will perform as advertised. Therefore, all we have to do is to look up predicted growth in California commercial floor space and we will know how many kilowatts and kilowatt-hours we need."

We charmed the California Energy Commission into letting us study just 22 California buildings below the red line. We already had a data base of 60 American buildings. These are all new buildings and all conform in principle to either the California standard or to ASHRAE, the American Society of Heating, Refrigerating and Air Conditioning Engineers, which is the American standard. The question is, do they? The answer is no, as one could have guessed if one has ever lived in a new building.

This is the distribution. Sure, there were three buildings that were way down here at only 80 of these units of BTU per square foot per year. By the time you got to the standards, maybe the most common thing was that the buildings came more or less around the standards, but there was a big tailout here: badly designed buildings that either were never made as advertised or where the building engineer never learned how to run them as he was supposed to. For example, this one is using two and a half times as much energy as it was supposed to.

The California buildings were all supposed to conform to the mandatory standard. Even worse, the shaded buildings--and this is something of a scandal--were all buildings that won energy performance awards from ASHRAE, which never actually bothered to get the utility bills to see whether the buildings performed as advertised.

Mrs. Grier: Were the recipients given incentive grants to do that?

Dr. Rosenfeld: No, they just got their pictures in the paper. The fact remains that this is a scandal, and now one should spend a little bit of money finding out why these buildings work so badly. It could be that the computer programs we wrote are wrong; I do not believe that, but it is a question they could ask. More likely, the buildings are not working as advertised, or possibly some of the buildings work four shifts instead of one and there is a legitimate reason. In modern society one should spend resources doing that sort of thing in addition to just making standards and believing they will work.

I have given you a picture show so far. The last thing is not a picture; it is a couple of remarks I want to make, handwritten last night. Point one is the no-losers test. I read some of the Ontario Hydro discussion of its conservation programs before I came here. In general the material is very good. The issues paper that was prepared for this committee was very nice reading and I commend you on it, and I think the Ontario Hydro stuff was well written. However, there is the continuous comment about a no-losers test and that we must worry about the no-losers test.

I would like to make a comment from my vantage point that I think is fair to make. I watch new buildings go up all the time. Even on my campus the chancellor keeps calling me and saying: "Okay, Rosenfeld. You know something about new buildings. Will you be on the committee for the new chemistry building?" I go and sit on the damn committee for the new chemistry building and I am appalled at the shoddy buildings that are going up on my very own campus. In the last building committee meeting I sat through, the builder claims that he does not have money to put in high-frequency ballasts for the lights, even though the cost of conserved energy is only two cents a kilowatt-hour, because he has some shoddy first-cost criteria. They do not put in variable speed motors for the fans even though the payback time is three years.

In general, nobody in any new building in the United States will put in anything that has a payback time of less than three years. I do not know about Canada, but three years is the absolute deadline. If it is a spec builder and you suggest two years, he will tell you to get out; but if it is a corporation builder, like the University of California, they may go for a three-year payback. At the same time, we are a society that is perfectly happy to go out and sell bonds to buy a new power plant and pay for it over 20 years, because the cards are stacked in the direction of big, visible investments and not investments in high-frequency ballasts.

The result of all this is that in most states we build a lot more power plants than we should. This forces up the price of electricity because we do not focus on the new buildings. What does this mean? It means that the nonparticipant--that is, me--who will not live in or have his office in a new building, is never protected. The nonparticipant is always a loser in new construction on the supply side, because we always go out and build expensive power plants, and nobody cares about the nonparticipant. He just pays off the bonds 20 years later.

If we are not concerned at all with no loser on the supply side, why should we be so concerned with no loser on the demand side? It is mixed-up thinking. I do not say that everybody should be a loser, but society should be the gainer. If there are three people somewhere who are going to lose two years from now for a little while because of societal decisions, that is the way it has to be. If you really cared about no losers on the demand side, you would make the people who need power for the new buildings pay for that power ahead of time. You would have capital recovery, and that is the way you would finance power plants. However, we do not do that. Therefore, do not overdo the no-losers test.

There is another comment I would like to make. In designing incentive programs there are two ways you can think about it. This is my point two. It says, "Incentives should be tied to results, not to first costs." When Pacific Gas and Electric gives you an incentive these days to save peak power, the payment is per kilowatt planned to be saved, and P G and E does not care whether you do it very cheaply in the form of thermal storage or whether you do it in a more expensive way with some lighting controls or whatever. All it wants is the results. After all, that is all society cares about.

In much of the United States we do it in a different way. We pass tax credits and say, "We will give you a 15 per cent rebate on your investment." That is a little bit counterproductive. It basically says: "If you are dumb and you invest in a windmill, which is not a very good way to generate power, we will pay you 15 per cent; if you are smart and invest in insulation, we will pay you 15 per cent," but insulation may be a far more cost-effective way. To a certain extent you are rewarding stupidity when you make your returns proportional to the investment rather than proportional to the returns. That is a point I have learned in the hard years.

The last remark I want to make is point five. It says, "Energy guides and weak standards." I want to inject into this thought that you cannot expect a utility to do everything. You cannot expect Ontario Hydro to come out and raise a debate about whether you should have building standards or energy guides. In particular, there is a certain tendency for a large group of people to say: "Building standards? That is big government. We do not want that," or "Appliance standards? That is big government. We do not want that."

I would like to say once more--maybe it is the third time and I am boring you--that in California the standards have worked very well. I was really against them at first. I was a free market economist who thought that if you give the public all the information it needs, the public will be rational. Over the years I have learned that you can advertise seatbelts but that people do not put them on, so that sometimes a seatbelt law is a good idea and it is not very inconvenient.

I have also learned that if you make standards reasonably loose so that really only the shoddiest 15 per cent of the manufacturers and the builders are affected, you can preserve society from a lot of harm and yet you really do not cause any complaints from the conscientious builder or the conscientious appliance manufacturer. After things get better or prices go up, you can always ratchet the standards up every few years but keep them reasonable.

12:30 p.m.

I am sort of encouraging you to have a debate not about whether we should have standards but about whether, if we are to consider standards, we

want weak standards, which will not cause a lot of opposition, or slightly tougher standards. In any case, I think a lot of the real improvement in California, which I showed you--that is, California has built seven power plants fewer than Texas--is because we have fairly weak standards. We started a game of beating the standards with incentives. It all works pretty well and we save money.

That is the end of my remarks, and I thank you. I am sure you will have some questions.

Mr. Chairman: Thank you, Dr. Rosenfeld.

Mr. Gordon: First, I compliment our presenter of knowledge this morning. It is always nice to listen to somebody who brings things down to a level that the public and the politicians can understand. I can see now why you have been successful in California.

Perhaps this is not a fair question, but, given the obvious need for much more of a conservation ethic within the utility industry, is it better to have the conservation innovator within the utility--part of the utility--or in a body separate from the utility, or is it something that should be mandated by government through regulation?

Dr. Rosenfeld: That is something which certainly does not have a yes or no answer.

Mr. Gordon: I realize that.

Dr. Rosenfeld: As I have seen it developing in California, initially what got the attention of the utilities was absolutely external forces. The utilities did not like this new ethic at all.

What got to them? One of the things that got to them was the California Public Utilities Commission. The utility would come in for a rate increase, and the California Public Utilities Commission would say: "Oh, that is very interesting. Now tell us about your conservation plan." The utility got the idea.

Even much more important than that was that California did not have any bad experience with nuclear power, but after a few years California still wanted to go power plant and Pacific Gas and Electric went to Wall Street to sell bonds. The people on Wall Street sort of giggled and were willing to sell bonds, but at less than their asset value, and PG and E presidents did not like that at all. Those were all external, real forces.

On the other hand, once management and PG and E learned their lessons, I think it is absolutely clear that the only people who have the resources to get those programs across are the utilities themselves. You are not going to find some sort of Ministry of Energy folks spending the equivalent of $500 million a year running successful programs. It is sort of obvious that you need tensions in both directions.

Mr. Charlton: The research programs that you have at Berkeley, I guess, have taught you some things about the way in which technological improvements occur. That seemed inherent in your comments throughout, where you talked about not only the current capability but also the potential. Some would say that your use of that potential technological improvement band in some of the charts you did is a band that is very difficult to estimate. Can

you talk to us just for a moment about how you best analyse what is likely to happen technologically in the next 10 to 15 years?

Dr. Rosenfeld: That is a very good question. Actually, I am glad you brought it out, because we do not put anything on these charts unless it already exists as hardware somewhere. It is true that I as a physics professor may know a little about which manufacturers to take seriously if we are already in touch with them because we helped them develop thin window films or high-frequency ballasts. In every one of these charts where we have put down future potential, we have measured that stuff in the layout already. We know it is lifetime or, if it is lifetime and it is failing somewhat, we know it is simple technological improvements to make small changes.

They are not really quite as much pie-in-the-sky as you might think, but I am going to use this opportunity to say that technology advancement is a fairly long-term arrangement, a long-term hurdle. I am going to use these extra two minutes to make the following point. In the US, the federal government spends about $150 million a year on energy efficiency research and development. That has paid off unbelievably well with returns on investment to society of thousands to one, by making high-frequency ballasts, more efficient lights, heat mirror films for windows, high-efficiency heat pumps, better high-frequency lubricants and so on.

One thing which is not Hydro's job, but which I will bring in, would be to consider actually doing a little R and D funding. In California now under the Reagan administration, the federal funds spent on R and D are decreasing, and Lawrence Berkeley Laboratory is all that is left. It may be $15 million a year, but the California utilities are funding straight research and development to the tune of more than $100 million a year with all these other things. That has resulted in good devices. It brings new industries to the state and it is something that a big province such as Ontario might want to consider as an extra way to have a breed of people who understand something about these possibilities.

Mr. Brandt: I have a brief question. At the very outset of your comments, Professor, you mentioned that the United States is reducing power as a percentage of the gross national product from 13 to 11 per cent.

Dr. Rosenfeld: That was all energy not just electricity, but the numbers are correct.

Mr. Brandt: You also said that Japan had been considerably more effective in that respect than the US and Canada and that Canada was stuck in around 15 per cent. Could you give me some indication of what impact our climate might have on the possibilities of our getting down to a more acceptable level? Let us say the target figure for the US is 13 to 11 per cent. Is it realistic for us to target in those percentile numbers or will our rather hostile northern environment cause us always to be considerably higher than other jurisdictions?

Dr. Rosenfeld: That is a very good question, and I have two remarks to make. First, I will repeat what was brought out in a question by Mr. Ashe. I was using world prices and not Canadian prices, so it might not even be 15 per cent. Your question, however, is still correct; namely, whether you can save a lot. I have often discussed those thoughts with my friend Bunli Yang from the Ministry of Energy. We realized last night in a discussion that this was going to come up. He is going to do some more work on this for Canada. I think we can charm him into breaking down the figures into not the sum but residential, industrial and commercial.

12:40 p.m.

Second, as we learn more about buildings, we learn that now that we have good insulation and double glazing available--I hope those windows are at least double glazed--buildings do not use much heat and the hostile climate does not have a lot to do with energy use. Let me give you a remarkable statement. Stockholm's weather must be rather similar to Toronto's weather. In office buildings in Stockholm now, even though they have a very efficient district heating system, two thirds of all the new office buildings that went up in 1985 did not bother to connect to it because they do not use any heat. That would seem to suggest that at least commercial building heating is not left as an issue.

In residential buildings, and you should know more about it than I do, I understand that a typical Saskatchewan superinsulated house only has an energy bill of a few hundred dollars a year for heat. That is not a big part of the $4,000 a year you guys are paying for energy. You could say the $300 is a penalty, but it is a small penalty. Gains will be made in more efficient electrical drive, more efficient fans and pumps in buildings and so forth. My casual guess is that the hostile climate has little to do with it. In Sweden, where I am an expert, it has almost nothing to do with it.

Mr. Brandt: Could you embellish your comments on Stockholm a little? I am intrigued by the two thirds of new buildings not requiring heat. What do they use as an alternative source of heat?

Dr. Rosenfeld: I can talk about that without having to use any engineering terms. In a building such as this, during occupied hours there is a lot of heat around. You are 100 watts, I am 100 watts. The lamps are two watts per square foot and so on.

Mr. Brandt: On a good day I may only be 90 watts. Go ahead. Your point is still relevant.

Dr. Rosenfeld: When energy was very cheap, we in America--and North America includes Ontario--built buildings so they broke even over occupied hours and we did not need very big air-conditioning systems. Then we let them cool off over the weekend. Most of the heat in American buildings is really for warming the damned things up on Monday morning.

The Swedes realized that by putting in a little better insulation and by triple glazing their windows, they could make the buildings tight enough so they broke even for the whole week. Then they did not need any heat and hence the comment about the Stockholm district heating system. That meant during occupied hours the buildings would heat up too fast. Then the natural American inclination would be to say: "The building is hot. Open the windows."

Instead, the Swedes installed thermal storage. They stored enough heat from you, me, the lights and the Xerox machines during occupied hours to warm the building up the next morning or Monday morning. It was all a case of going in for very cheap thermal storage. It is such a success that it turned out there is a connection charge. There is a threshold charge for the district heating system, but the typical Stockholm office only has a little 40-watt electric radiator over by the window for trimming the office temperature.

It was not worth paying the connection charges any more. Pretty soon the Stockholm district heating system will get rid of its connection charge and people will stop boycotting it. In any case, it makes my point. It is correct. Thermal storage is a darned good way to save energy.

Mr. Brandt: Can I ask another unrelated question? Recent evidence indicates that in well-insulated buildings we start to run into another problem, which is the indoor environment. More recent studies have indicated quite clearly that the environment inside a building is far more dangerous in many respects than the outside environment, which most people pay attention to: car exhausts, sulphur dioxide emissions and all that kind of thing.

In a building that is as well-insulated as the Swedish experience you have mentioned, or perhaps in other examples you might have in the United States, what difficulties are they running into in environmental tradeoffs? Are problems developing that have to be addressed in a serious environmental sense, or do you feel the hostility of the indoor contaminants has been reduced through exchange of air or some other engineering application?

Dr. Rosenfeld: That is an extremely good question. It is my favourite topic. Of the 150 people in our biggest research group at Berkeley, the largest single group of 35 people is in indoor air quality. We think we are the people who persuaded the United States that indoor air is a much more serious problem than outdoor air because we spend 80 per cent of our waking hours indoors and not outside.

Certainly, I am on your side. If approached rationally, I think it is a nonproblem; that is, buildings need fresh air. This room should be getting about two tenths of an air change per hour--no, there are a lot of us here--three tenths to four tenths of an air change per hour. Your house should get three tenths of an air change per hour. However, that does not mean it has to blow in in an uncontrolled way. It simply means that when you design the house, you want to design it so, during the deep-heating season--or in America the deep-heating and deep-cooling seasons--you can close the windows tightly and have an air exchanger. Those can be of many sorts. They can be air to air, air to hot water or whatever, but those technologies work okay. During the spring and fall you open the window and you may even want a whole-house fan.

The problem arose because people took existing buildings which did not have good air circulation systems and said, "We will just save energy by closing the windows and cutting down on the fresh air." That is absolutely not what we would recommend. With new buildings and homes it is not a problem. You have to put in another $500 worth of capital investment, but it pays for itself in saved heating and cooling in a few years. After that, you can have all the fresh air you want. If you have an air-to-air exchanger, it can be 65 per cent to 70 per cent efficient. You can have half of the air changed per hour as far as fresh air is concerned and your furnace only thinks you are having a sixth of the air changed per hour, so it is happy.

Mr. Brandt: I could go on with this at some length, but I know there is a time problem. Can I ask another question or would you prefer to close at this point, Mr. Chairman?

Mr. Chairman: You phrase your questions very accurately and succinctly.

Mr. Brandt: As you know, I am always brief.

Mr. Chairman: Considering the importance of the issue, I will encourage you to ask one more question.

Mr. Brandt: I will try to make it as direct, brief and succinct as possible, which is always difficult for me, as my colleagues know.

Do you feel there has been adequate research into the question of indoor air quality from the studies you have done and the fact that you are at the leading edge of this science, or do we have a great deal more to learn about the new technologies that are being applied to this totally insulated building you have described? The term "totally insulated" may be inaccurate, but it is a more complete closure, if you will, from outside elements that vary the heat rather dramatically.

Dr. Rosenfeld: We make a great team. You ask all the questions you should and I will give you two answers.

Mr. Brandt: I have to admit, you and I were briefed last night. I am kidding. I did not meet the professor until today.

Dr. Rosenfeld: I swear I have never met him before.

I will give you a categorical answer and then two examples. No. I feel absolutely that indoor air is a very serious problem. I am going to give you a commercial building example and a residential example. Our society should expend a hell of a lot more effort worrying about monitoring indoor air. We are all obsessed with outdoor air for historical reasons and we are barking up the wrong tree.

To be more specific, let us look at radon in American homes. Mr. Snell, do you know whether there are any pockets of radon up here?

Mr. Gordon: Sure there are, in Sudbury, for example.

Dr. Rosenfeld: In the United States, give or take a factor of two of uncertainty, there are 10,000 lung cancers a year caused by radon. In 1980 we recognized this; by 1981 we were all set to have a national survey and try to find all these pockets of radon.

If I sound a little furious, it is because the Reagan administration came along and said: "We do not believe in discovering any new problems. Lawrence Berkeley Laboratory, you will not conduct your radon survey." It is six years later and I claim 60,000 people have died. We are still just barely building up the pressure for our radon survey. I feel strongly about this.

12:50 p.m.

It is absolutely essential that we do surveys of indoor air quality, particularly where we already have clues that there are pockets of radon gas. We know how to fix these homes very cheaply if we can simply locate where they are and then work with the health authorities to show what mitigation measures work. Usually it is just a small fan somewhere. The idea that we should just pretend this problem does not exist is terrifying. In the residential area the main problem is radon; there are some other small contaminants, but that is where we ought to focus our work.

In the commercial area, it is even worse because it is easy to put sensors in commercial buildings and sense miscellaneous things, mainly organics, that come diffusing out of new plastics and wallcoverings and rugs. The most famous one is formaldehyde; we are learning about that and control it better now, but there are many others. I could show you a mass spectrograph of the organic levels in a new building for the first year. What you would see would be individual spikes of things that are not good for you, all of them at only something like 10 per cent of the allowed level but 100 spikes. No one

knows how they work together synergistically, and no one in my country seems to care very much.

What we ought to do, since we do not know, is have adequate ventilation. We ought to have cheap sensors for organics in buildings, particularly in new buildings; they would stay there. We ought to have the ventilation rates very high for the first year or so, so we do not have these "sick building" syndromes. But we do not even put the sensors in the buildings. There is very little research work going on. There is no machinery--

Mr. Brandt: Excuse me. What would the cost be for such a sensor?

Dr. Rosenfeld: Ten bucks.

Mr. Brandt: That is absolutely ridiculous.

Dr. Rosenfeld: To make this point, let me give you the worst example that happened recently. We have this phenomenon of what are called "sick buildings," which appear in the United States. They usually appear because some manufacturer, let us say of glue for the carpet, was not very careful about having cured his glue and so this stuff is vaporizing. When people begin to complain to the building engineer, he tries to fool with his system. He spends all his air fan capacity on the part of the building where people are complaining, but somewhere else he gets unbalanced and the whole system gets out of control.

What happened recently in California was that the crescendo of complaints to the building engineer got worse and he decided something must be terrible. He went up on the roof of a building in Walnut Creek and peered across at an oil refinery, which is about a mile away, saw a lot of clouds and said, "I know what the answer is; this pollution is coming from the outside and not from my building." He turned off all the fresh air, and 15 minutes later they had to evacuate the whole building.

All of that could have been controlled with a few sensors and a little computer somewhere, but we do not do that yet. It is all very primitive. There is no excuse for being discriminative in this high-tech age. If that is the sort of thing in which you have a little bit of interest in this part of the world, more power to you; it will pay off.

Mr. Brandt: I do, for a couple of reasons, and I will close at this point, but recently there were some--

Dr. Rosenfeld: Do we not make a great team?

Mr. Brandt: Recently some newspaper stories out of Detroit indicated the courthouse there caused a number of people to become very seriously ill. One of the ways they are controlling it, based on information I have read about in the past 24 hours, is that they are limiting the number of people allowed in the building to 2,000. They do not know the source of the contamination. The building has been up for a considerable length of time--it is not a new building--but they have some source of contamination in the building that is causing very serious health problems.

That brought home to me very dramatically that indoor air quality is a matter of very serious concern. In addition to that, in Canada we have recently gone through the exercise of attempting to remove some insulation material at a cost of something in the order of $350 million. There still is

no scientific evidence that I have read which indicates the insulation is the culprit. The federal government is still rather ambivalent as to whether the insulation is the key culprit, but it was removed at a tremendously high cost. Obviously, when you put in foam insulation, it is very difficult to extricate once it is in place. We did not have sufficient information about the insulation before it was applied as an energy-saving device.

We have to be very cautious in the way we move towards some of these areas of new technology. At the same time, I agree with your entire presentation, which I found very intriguing. I would like to read some of your books. Can we buy them wholesale if we buy them in quantity?

Dr. Rosenfeld: I am going to say one thing for Mr. Brandt, and then I will shut up, with respect to this business of new products outcasting, as it is called.

I spent a lot of time in Sweden because they are ahead of us, as I learned in many stories. When the Swedes realized they were going to have "sick building" troubles, they started tidying up their buildings. They started doing a very simple thing; they required that new builders take samples of glue, carpets, an occasional chair and so on, put them in a room and measure the rates at which they were outcasting.

What they discovered was that two thirds of the whole problem was coming from imports, mainly from Poland. Poland makes a lot of very attractive plywood furniture, which is glued together with formaldehyde, as well as upholstered furniture, chairs and so on. With very little trouble they pinpointed these Polish imports, essentially phoned the Polish manufacturers and told them they had two months to straighten out their act, otherwise they would forbid the importation. The Poles learned how to cure their formaldehyde and everybody is happy.

These problems are not difficult institutional problems. If you put a little pressure on it, I think you will find the National Research Council of Canada will be happy to help you monitor some building products before they get glued or put in the walls, where they are hard to get out of.

Mr. Brandt: I apologize to committee members, and I will stop at this point.

Mr. McGuigan: You and other people have focused on motors, refrigeration and mechanical aspects. I do not think anyone has given us any graphs to show the difference between a poor motor and a good motor. If so many watts of electricity go into a motor and so many horsepower comes out of it, what is the difference between a good one and a bad one? Also, in terms of manufacturing, what is the difference in cost between a good one and a poor one?

Dr. Rosenfeld: There are two aspects to that question, and they are very simple to understand. Incidentally, there is another interesting piece of technology here. If you look in a 1930 Sears catalogue, you will find the standard quarter-horsepower motor used around the house had an efficiency of about 55 per cent. If you look in a Sears catalogue for 1972, just before things started getting better again, you will find the efficiency of that motor had sagged to about 40 per cent. Why? Space age technology.

In 1930, they could not run the motor hot because the insulation was made out of varnished cotton, and if the motor got too hot, that stuff would

smell bad. They put enough steel and copper into the motor, in designing it optimally, so it did not get very hot. Along came wonder plastics like Teflon, and you could start making smaller copper wires, which were cheaper, and coating them with Teflon. Also, Teflon did not stink when it was hot. They could make crummier motors out of less steel and less copper, but they were smaller and the motor efficiency sagged. Then the price of electricity started coming up, and people went back to 1930 technology and got the motor efficiencies up again.

Since then, however, there have been really big breakthroughs. Something like 30 per cent of all the electricity that Ontario Hydro generates goes to turning big motors for commercial uses or for running fans. The trick these days is to go to variable-speed motors. For example, it used to be that to run a big fan for this building, say, you would design the fan to keep peak capacity on the coldest day of the year, and then on other days, when you did not need all that air, you just put a baffle in front of the fan. That is a silly way to do it. Instead, you want a variable-speed fan. That is new, digital control technology, which costs a little bit more in first cost but saves a lot of power later.

The improvements are both to get high-efficiency equipment in the first place, which is easy, and then to go to electronic control, which is a newer technology.

Does that give you a picture of what the steps are?

Mr. McGuigan: Yes.

Dr. Rosenfeld: But it is a lot of electricity. In America, I think 35 per cent of all electricity is used at efficiencies that could be doubled by going to better motors and better controls. It is a lot of power plants.

Mr. McGuigan: It would help if that were explained more often. You get a sort of generic explanation that motors should be improved, but no one so far has told us much about it.

Dr. Rosenfeld: I will try to be more graphic in future.

Mr. McGuigan: Thank you.

Mr. Brandt: Hydro has spent money on looking at more efficient motors for some of its generating needs. I personally have had some involvement in some of the work that has gone on in that area through some companies that are in the area where I am located. It is probably not enough, but at least some work has gone on.

Dr. Rosenfeld: I would like to make one pro-Hydro comment. I spent yesterday afternoon with some folks from Hydro, and they were just great; they know what they are doing, and they want to do all the right things. I am not sure whether they get all the resources they need, but I do not think there is any lack of good intentions. Again, I do not see hundreds of engineers out there with the resources to give the advice that is needed.

Mr. Chairman: Thank you very much for a good presentation.

The committee recessed at 1 p.m.

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

WEDNESDAY, APRIL 9, 1986

Afternoon Sitting

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
VICE-CHAIRMAN: Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
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McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Brandt, A. S. (Sarnia PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Mellor, L.

Staff:
Moore, L., Adviser, Electricity Section, Policy and Planning Division, Ministry of Energy
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

Individual Presentations:
Robinson, Dr. J. B., Associate Professor, Department of Man-Environment Studies, University of Waterloo
Torrie, R., Assistant Co-ordinator, Energy Research Group
Figuieredo, C.

From Marbek Resource Consultants Ltd.:
Brooks, Dr. D., Director

Individual Presentation:
Rosenfeld, Dr. A. H., Professor of Physics, University of California, Berkeley; Adviser, Building Science and Acting Program Leader, Energy Efficient Buildings Research, Applied Science Division, Lawrence Berkeley Laboratory

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Wednesday, April 9, 1986

The committee resumed at 2:12 p.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: Members of the committee, we have a panel this afternoon. Dr. Robinson is going to be looking after us this afternoon, are you?

Dr. Robinson: That is right.

Mr. Chairman: Not Mr. Torrie?

Dr. Robinson: No. I will be kicking off.

Mr. Chairman: You are the co-ordinator?

Dr. JOHN ROBINSON, RALPH TORRIE AND CHARLES FIGUIEREDO

Dr. Robinson: We rotate.

My name is John Robinson. I will be appearing as part of a panel with Ralph Torrie on your left and Charles Figuieredo. I think Ralph and I are familiar to you. Mr. Figuieredo is an energy consultant with considerable background and expertise, particularly in industrial energy conservation.

The purpose of our testimony today is to present the results of some independent estimates of the effects of pursuing an electricity-efficient future for Ontario. The results we will be presenting are not an estimate of conservation potential in the way you have been hearing about it--that is, how much we can save from the forecast. Instead what we have done is to build up independently for the year 2000 an electricity-efficient economy based on Ontario Hydro projections of what is going on in that economy and then to compare the results of that analysis with those that are contained in the Ontario Hydro forecast.

The electricity demand that we are going to be talking about is built up from a number of factors: demographic and economic growth, how many people there are, what the economy looks like, material standard of living, how many goods and services people are demanding and using and changes in the efficiency of electricity use. This is a bottom-up type of end-use approach, which essentially multiplies activity times energy use per unit of activity to get total electricity use.

We are not going to deal with the questions of demographic or economic growth or changes in material standard of living. We are just going to assume the values that Ontario Hydro has built into its end-use forecast. Our numbers are going to be directly comparable to those that are in the end-use forecast in the sense that the amount of economic growth, the amount of commercial floor space, the number of households and the number of people are all the same as those in the Hydro forecast. The only difference, then, is in the assumptions about intensity of use or efficiency of electricity use so that we can compare our numbers directly with the end-use forecast numbers.

Because of the fairly serious data constraints that you have heard a lot about in this committee and because of fairly serious time constraints as well, we are dealing only with electricity use in the year 2000; we did not do a detailed picture of the intervening years. We built up electricity demand in the year 2000.

The presentation we are going to give will be in five parts. We will first present and review the Ontario Hydro end-use forecast. I will be doing that, since we are using the activity projections built into that forecast.

Then Ralph and Charles will present the efficiency scenario for the year 2000. Ralph will present the analysis of the residential and commercial sectors and Charles will present that for the industrial sector.

Then I will compare the Ontario Hydro end-use forecast with the efficiency scenario that we have built up in the year 2000 in terms of overall electricity demand by sector.

Ralph will then say a few words on the cost and employment impacts of the efficiency scenario, what it is going to cost or what it would cost, and what kind of job implications there seem to be from pursuing this efficient electricity demand future.

Finally, I will say a few words about what this means in terms of required new capacity and need for generating stations, etc.

To begin, we will start with the review of the end-use forecast. As you have heard a number of times in this committee, you cannot do detailed conservation or efficiency analysis without end-use data and without taking an end-use approach. Therefore, in order to be consistent with the projections of activity, population and economy that Ontario Hydro is using, it was necessary to use the Ontario Hydro end-use model forecast rather than the forecast from the economic and demographic energy model, or the econometric forecast.

As you heard this morning, you cannot relate the econometric forecast to activity levels, floor space or numbers of appliances of various types; you have to have an end-use approach for that. We took the activity projections from the Ontario Hydro end-use forecast. Before I go into that I want to make the point that the end-use forecast for 1985 is essentially the same as the econometric forecast, the EDEM forecast that was used for the recommended official 1985 planning load forecast, which will be out fairly soon, I understand.

Here is the recommended peak, the recommended forecast projection of peak demand in the years 1985 to 2000, rising rather rapidly to 28 gigawatts by the end of the century. At the system load factor that Hydro assumes, that translates to about 600 petajoules of electricity in the year 2000. As you can see, the end-use forecast is very similar. This is because Hydro more or less calibrated the end-use model to the recommended forecast this year.

Thus, by using the end-use numbers we are diverging slightly from Hydro's recommended forecast, but not in overall, total terms. There is a bit of a change in the sectoral distribution, but basically we are using a forecast that is essentially similar, as similar as Hydro could make it to what its recommended forecast is. We will be comparing to the end-use numbers rather than the recommended ones, but the difference in overall electricity demand is not great. The difference in how they got them, of course, is substantial. You can see here the small size of the differences.

The demand growth rate that is being projected here is about 2.65 per cent per year from 1985 to 2000. Built into the end-use forecast that you see is fairly substantial growth in electricity demand in each of the three main sectors, and from here on we will be talking about these three sectors. There is a tiny bit of transportation demand to run the Toronto Transit Commission and there are also what they call adjustments to take the sectoral demand up to the primary demand. Those are both small terms, and we will be focusing on three sectoral projections of electricity demand.

You can see that the residential sector grows rather substantially over that period from 1985 to 2000, from about 130 up to about 185. Commercial grows, if anything, a little faster, and industrial as well, so that there is fairly substantial growth in electricity used in Hydro's projection. This comes as no surprise; it is familiar to you from having been presented by Hydro itself. Essentially it is between 40 per cent and 50 per cent growth in each of the three sectors. That is despite whatever assumption there is about conservation in those projections. Thus, it is 41 per cent residential, 45 per cent industrial and 49 per cent commercial.

2:20 p.m.

This end-use projection is really based on multiplying two things together in principle. One is the number of things going on out there--the number of households, the number of people, the number of appliances, the amount of economic activity--multiplied by their energy efficiency or intensity. If we look at the first of those, we see the activity levels in the Hydro forecast all indexed to 1985 equal to 100. The reason we did this, of course, is that there are different units. Here it is number of households in the residential sector; commercial is the floor space, how many square many square metres there are in health care institutions, warehouses, recreation, offices, etc.; industry is the output of the industry. We see fairly substantial growth in the forecast.

We took these growth numbers as given. We accepted the growth in activity. In our efficiency projection we have exactly the same number of households and the same amounts of floor space and economic product.

It is interesting to compare Hydro's activity projection with its electricity demand. Electricity use is going up more quickly than the level of activity. The number of households is going up 26 per cent by 2000 from 1985, and electricity demand is going up 41 per cent. In the commercial sector the number of square metres of buildings is going up 43 per cent, and electricity demand is going up 49 per cent. It is the same for industrial: a 35 per cent increase in the size of industry and a 45 per cent increase in the amount of electricity being used in the end-use forecast.

Essentially this shows fuel switching, switching to electricity from other fuels; as well, new uses are absolutely overwhelming any conservation that is occurring. In other words, the effect of whatever conversions there are to electricity and whatever new uses there are that were not around in 1980 increases electricity demand more than conservation reduces it in Hydro's projection. That in itself is an indication either of how little conservation there is or else of how much fuel switching and how many new uses there are. In other words, Hydro is projecting an increasingly electricity-intensive economy and society in Ontario.

Our analysis focused on the end uses for which this electricity would be meant. It shows you a projection of total electricity use in the year 2000. In

the residential sector we can see 185 petajoules or so of demand broken down into roughly a third for heating and cooling, space heating and space cooling, less than a quarter for water heating and the rest in appliances. A fairly substantial amount of the total is in appliances. Of course, this heating and cooling is only electrically heated houses. In a total sectoral basis that would be much larger if we included the gas and oil, but this is just electricity use.

In the commercial sector we see that heating and cooling are substantial. Lighting is the biggest use, and auxiliary or motor drive is also substantial. In industry, motors are the single biggest term by far. There is a certain amount of industrial lighting and some industrial high-temperature processing and electrolysis; electrolysis is a very small component.

Those are the end uses. Essentially those six end uses were what we focused on. Given a forecast of how much activity there is, how efficient could those end uses be made at a reasonable cost?

Mrs. Grier: Those end uses are Hydro's figures?

Dr. Robinson: This is Ontario Hydro's projection, yes.

Mr. Snell: Motors are by far the largest end use.

Dr. Robinson: In electricity end use in industry.

Mr. Snell: If you add all three of those.

Dr. Robinson: Oh, if you add them all, yes. Since I could fit only six on the graph, I lumped auxiliary and motor together, because auxiliary in the commercial sector is all the small ~~motors~~, equipment, computers, etc. It is quite a wide range of things, whereas these tend to be in the commercial sector.

Mr. Charlton: In the residential sector, which of the three components would take in residential lighting?

Dr. Robinson: Residential lighting is under appliances. It turns out to be fairly small. I have the number; I could check it for you. It is a fairly small term in the total appliances.

Ralph will now present the results of our efficiency analysis for the residential and commercial sectors.

Mr. Torrie: Mr. Charlton, electricity for residential lighting averages around 750 kilowatt-hours out of a total use for appliances of at least five times that.

The last chart that John had up is very interesting; I want to take another look at it. You see there in one glance a picture of all the major markets for electricity in this province, and I am going to be addressing myself to the residential sector and the commercial sector.

First of all, the residential sector: This is all of the electricity use for the residential sector in 1985. It is about 23 per cent or so of total energy use in the residential sector. If you were showing all residential energy use, it would be four times higher. This is just the electricity use, and there are only three pieces to it, the largest by far being the appliance

uses, the second largest being heating and cooling and a smaller component being electric water heating.

In our analysis, as John said, we used the Ontario Hydro activity projections for the residential sector. We used its figures for number of households and for the breakdown of households by single-family dwellings versus apartments and row housing. We used its household size in terms of number of people per household. We were basically adopting totally Hydro's activity levels for the year 2000. Then we started to lay over that energy-efficient technology. I cannot go into all the details. There are hundreds and hundreds of numbers involved in these kinds of calculations. I will just show you some examples; we will be leaving more detailed evidence with your staff.

Here, for example, are some figures that show the energy use required to be produced by a heating system in a typical Ontario house--4,100 degree-day climate, about 100 square metres. You have about 105 gigajoules for the average fuel-heated stock. Electrically heated homes have always been more efficient in this province. They were around 85 gigajoules in 1980. The current energy-efficient standard, which Ontario Hydro has referred to in its evidence, comes in at about 63. If you go to the R-2000 house, you are down to 36. If you go to the level of insulation, energy and air-tightness characteristic of subdivisions now being built all over Canada now but pioneered in Saskatchewan, you get down into the 12 gigajoule range.

There are a few non-Canadian examples here to show you the kinds of things going on in other places. The Minnesota energy-efficient housing program is coming in around 21. There is a prototype home in New York that came in at six. Of course, the Swedish housing designs are traditionally very efficient and are getting more so, with one subdivision that was recently completed coming in around 15. The newest houses being built there are coming in as low as seven.

2:30 p.m.

You can see there has been a remarkable progression in the technology of energy-efficient construction. Canada has been a world leader. Now that the government of the day in Ottawa has seen fit to dismantle the National Research Council's energy program, it remains to be seen whether we will be able to maintain that lead because research and development and a strong leaderhip from NRC was instrumental in putting Canada in the forefront of world technology and energy-efficient housing.

We assumed in our scenario that for houses built in the last part of the 1980s we would achieve the R-2000 standard and for housing built in the 1990s we assumed we would achieve something not quite as good as the Saskatchewan standard. About a 15-gigajoule standard was adopted.

However, most of the houses that will be standing in the year 2000 were already standing in 1980, and here is the question of what one does with that stock in terms of retrofit. I have designed about 12 or 15 different retrofit programs for different types of housing in Ontario, depending on age, size and so on, but this is the biggest one. That is the retrofitting of the pre-1981 electrically heated single-family dwelling plus 250,000 conversions to electricity from other forms of heating fuel, which is much higher than the conversions to electricity than Ontario Hydro has been suggesting would occur in that stock. It is a very vigorous pro-electric scenario, and it is characteristic of energy-efficient futures, that when you go for the

super-efficient level, the role of electricity in a relative sense does begin to increase.

The super-efficient houses that I was referring to a moment ago are all-electric houses, and you will also see in the commercial sector, when I get to it in a minute, the increasing relative role of electricity if you do go for super-efficient standards.

This particular program reduces the requirement to about 45 gigajoules per household. The electric houses probably start at around 85, and the nonelectric ones start somewhat higher, but assuming they all start at around 85, the cost of this program would be coming in somewhere around $3 billion altogether, with an average cost of saved energy, using Ontario Hydro's standard costing method, of 3.2 cents per kilowatt hour saved. That happens to be the same as the cost of Darlington except this energy is permanent. This energy does not tend to surprise you once it is in place. It does not burst tubes, and it is delivered. These costs are for delivered energy.

Mr. Snell: Mr. Torrie, would you explain why in a super-efficient home electricity plays a bigger relative role?

Mr. Torrie: It is simply because one of the key features of energy-efficient housing is that it be airtight. It does not mean that air circulation is cut off; in fact, quite the opposite is true. Air circulation is controlled by technology. There is usually an air-to-air heat exchanger installed to make sure the heat from the exhaust air is captured. What you can get away without is a furnace and all of the heat loss associated with chimneys and so on.

It is also the case that when you go to the super-efficient housing standard, the capital cost of a gas or oil-furnace and all the associated ductwork is difficult to justify given the very low energy demands of the house for space heat. You have a house that is using an average of 15 gigajoules per year for space heat. If a gigajoule costs even as much as $15, you are still only talking about a couple of hundred dollars a year for your fuel bill, and these super-efficient furnaces cost several thousand dollars, as much as the lifetime heating bill of the house. The argument for going electric, especially from the home owner's point of view, is quite compelling, for both technological and financial reasons.

Mr. Gordon: What would be the added cost to retrofit on an average house? Have you got that figure?

Mr. Torrie: With these particular houses, I think I was at about $6,000 per household. You can spend that much on these older homes because there is so much to get. On the more recent housing, the numbers go down and the savings are less, but they were built more efficiently to begin with. I will detail this in writing to your staff, but even in the simple calculation I did, I ended up with some 15 separate retrofit programs for different housing ages and types. These are the most expensive ones, and they are also the ones that give the biggest return.

I added up all of the retrofit programs. That one would cost $3 billion. These are just electrically heated houses and houses that are converted to electricity. We are talking about retrofitting 948,000 households by the year 2000, at a cost of just over $4 billion. You can see that program for single-family dwellings I just showed you is the lion's share of the entire retrofit programs, partly because most of the houses that will be standing in

the year 2000 are pre-1981 houses. The average for the whole retrofit program then comes out at around 3.2 cents per kilowatt hour, and it is saving the equivalent of two nuclear reactors' worth of output.

That is the way we gradually build up a scenario of energy-efficient activity in a future target year, in this case 2000, and we do the same thing for appliances, which was one of the other major uses of electricity in the residential sector. I will not spend too much time here except to show you that these numbers on the left are the per-appliance kilowatt hours that are used in Ontario Hydro's end-use forecast. The figures on the right are the per-appliance kilowatt hours, which we use in our energy-efficient scenario, and you can see that we are lower than Hydro. We especially disagree on the question of lighting. I think they have totally missed the boat on the potential for energy-efficient lighting. Apart from that, we have not really gone too much below Hydro compared to how far below them we have been from time to time on some of these numbers.

There is nothing radical about the numbers we have adopted here. The 600 kilowatt hour refrigerators, for example, are mass marketed, and you can buy those now. There is the Amana ESR14E in the US, the Toshiba GR411 from Japan, the Electrolux TR1120C, European techology. All come in at or under the 600 kilowatt hour per year level for a good sized 16 cubic foot refrigerator. That is what we did with appliances.

Mr. Snell: Is the difference between your scenario and Hydro's mainly in penetration rate or in technical potential?

Mr. Torrie: It is both. We do have faster and higher penetration rates for the new technolgy than Ontario Hydro, but these numbers do not show that. These numbers simply show the per-appliance energy that we are assuming by the end of the century compared to Ontario Hydro's figures.

Mr. Snell: That basically means a stock of more efficient appliances than Hydro is predicting will be the stock?

Mr. Torrie: That is right. We are not that far apart on technology, but we do have a much faster penetration rate. This is their average refrigerator efficiency in the year 2000 and this is ours.

Mr. Snell: Do you make any assumptions about incentive programs to come up with that kind of scenario?

Mr. Torrie: The problem you have with appliances is when you start to look at the marginal cost of bringing these energy-efficient appliances in, it is not obvious that it is related to the energy consumption. There is one diagram--and I wish I had it on the slide--which shows the cost of refrigerators versus their consumption, and you cannot even draw a relationship. The dots are all over the place.

There are fridges being built cheaper that are using less energy than one that costs more, so it is very difficult to say whether the energy-efficient appliances will cost any more. Most of the improvements are design improvements, which do not necessarily involve the use of more material.

Mr. Snell: I am still not clear on why you think the scenario is going to be different from what Ontario Hydro projects. Why are you more optimistic about it?

2:40 p.m.

Mr. Torrie: First, Ontario Hydro is trying to come up with a scenario on which to plan the expansion of their system so they have built in conservatisms. Our approach is more, "What if we went after energy efficiency with the same vigour and enthusiasm that we had gone after nuclear electricity in the last 20 years, what would we achieve?" Naturally we come up with different numbers. On the one hand you have the utility that does not really accept, understand or embrace energy conservation, as far as I can tell from the evidence I have seen before the committee; trying to figure out how much conservation might happen and therefore, how much capacity they have to build.

On the other hand, our approach says energy efficiency is as valuable--in fact, more valuable than energy supply. Let us go for it. Let us find it and see what can be accomplished. When we build our scenarios, we take an aggressive approach to energy efficiency in the same way that a supply side company might take toward the supply technology. We say, "Let us go out to find it." If it makes sense economically, we put it in.

Mrs. Grier: You have not assumed regulated standards in your scenario here?

Mr. Torrie: No. All we have assumed is that the appliances in the province will be this efficient. The question that begs, and what you have just raised is, "How can you bring about these standards?" There are any number of ways: one is mandatory standards; another is pricing policy.

Mrs. Grier: If you were anticipating standards being set, would the figures in your efficiency scenario be even lower than they now are?

Mr. Torrie: We certainly are not pushing the limits of technology with these numbers because of the problems I mentioned a minute ago; I do not know how much further we can go and still make economic sense. It is hard to tell whether these energy-efficient appliances really need to cost anything more than their energy-wasteful counterparts.

Mr. Charlton: By way of comparison, could you give us a rough idea of what the average kilowatt use would be in the same list of appliances today? What would the average fridge be today?

Mr. Torrie: The average fridge today would be around 1,100 kilowatt hours, maybe even higher. One of the problems I ran into with that is the big energy guzzlers are using 1,400 and 1,500, but a surprising number of Ontario households have second fridges, which are often bar fridges that are much smaller, which is bringing the average down. A big 17 cubic foot frost-free fridge/freezer, you are talking more like 1,400 or 1,500 kilowatt hours; the average for all fridges in the province is closer to 1,000 kilowatt hours. The limits of technology in state-of-the-art refrigerators of that size now can come in as low as--you probably had expert evidence on that earlier today but you can certainly get down into--the 300-kilowatt hour range and lower.

As far as space cooling goes, which is another end-use that is identified by Hydro, there is not too much we have to say about that. It is not a big term to start with. It happens to be the case that space cooling demands will decrease as houses become more energy-efficient because their thermal time constants--to use a technical phrase--gets longer.

Once they get down to the levels that we are talking about, space

cooling demand will probably disappear. We have left the space cooling in there--it is not a big number--we figure maybe about 30 per cent below Hydro's estimates on that.

Finally on water heating, we did not really do too much dramatic in this way because electric water heating, after all, is fairly efficient to start with. We simply assumed some reductions due to flow restrictors and so on, that kind of technical fix, which is very cheap by the way. Investments in reducing water-heating energy come in at less than half a cent a kilowatt hour.

This needs to be part of any residential retrofit program. You have to make sure that if you are going in anyway, you get the water and the water heating improvements made while you are doing the job.

A bottom line looks something like this. On this chart there are two bars--a pair of bars for each of the end-uses I have discussed, some in more details than others. These two are for space heating, these two are space cooling, these two are water heat and these two are appliances.

The first bar is Ontario Hydro's electricity use in the year 2000 for that particular end-use; the second bar is our estimate in an energy efficient scenario of electricity use for that particular end-use in the year 2000. In spite of our hundreds of thousands of conversions to electric heat, our much greater levels of energy efficiency ensure that there is a lower level of electricity being used in our scenario for space heating than in the Hydro scenario, even though there are more houses being heated electrically in our scenario than in theirs.

Here you can see the effect of our assumptions about appliance efficiency coming in at somewhere around 66 per cent of Ontario Hydro's estimates. There is improvement in water heating. Part of it comes from the reductions in use that I mentioned; part of it comes from a five-degree centigrade reduction in temperature from 60 to 55 degrees above ambiant; and part of it comes from a two-per cent increase in the efficiency of electric water-heating systems from 78 per cent to 80 per cent. That sums up the residential analysis very quickly.

In the commercial sector--I am afraid I am making a bit of a mess of your charts, John. I am going over my time so I will be quick on this sector and go straight to the summary.

This graph does the same job for the commercial sector that the one I had on a moment ago does for the residential sector. For space heating, it shows water heating, lighting and appliances, which are really auxilliary applications--service motors and so on--on the one hand, Ontario Hydro's 1985--

<u>Dr. Robinson</u>: You have the intensity chart up.

<u>Mr. Torrie</u>: I have the wrong chart up. I was doing such a good job of explaining the other one. I am sorry.

This is actually a reminder of the breakdown of energy use in the commercial sector. This is for the hydro scenario, you can see the space heating use increase dramatically in the commercial sector by the end of the century, and the other one staying more or less level with slight declines.

<u>2:50 p.m.</u>

This is how our numbers compare to Hydro's in those same categories of end use. The thing about the commercial sector is that the data problems here are particularly severe, which is particularly unfortunate because it is a very electricity-intensive sector. It appears there is an absolute gold mine of energy savings that are available at very low prices. You see repeated references in the literature to 40 per cent savings being possible with very low levels of payback costs--less than two cents a kilowatt-hour--on these efficiency improvements.

We went through the commercial sector and broke it down into a number of subsectors: educational institutions, health institutions, religious buildings, other institutions, offices, stores, hotels, recreational facilities and warehouses. For each of those we looked at the current and retrofit potential for heating, cooling, lighting, water and auxiliary, which are the end uses you see here. Then we did similar exercises, as we did in the residential sector, for new buildings. Once again, the trend is very much towards electricity if you go to super-efficient commercial construction; that is the way we went.

By the end of our scenario, the most efficient office buildings, hotels and schools are being built as all-electric buildings, with virtually no space heat load per se, the reason being that commercial buildings are quite capable of staying warm, if they are well designed, just by running on the heat that is being generated in them by the lights, the people and the equipment. The state of the art in new commercial buildings is advancing very rapidly. Reductions of 40 to 50 per cent through retrofits seem quite feasible for existing buildings at two cents a kilowatt-hour and less, once again using Hydro standard costing.

What we ended up with--in spite of this trend towards space heat, once again because of the super-efficiency--was an absolute reduction in the amount of electricity being used for space heat, similarly with cooling. Once again, with lighting we are in quite sharp disagreement with the Ontario Hydro figures. We feel there is roughly a 50 per cent opportunity for reducing the energy intensity of lighting in the commercial sector. In the auxiliary category, with service motors and so on, once again you see the impact of energy-efficient motors and so on gradually taking over here.

Mrs. Grier: Excuse me. Are you assuming voluntary efficiencies, and what kind of payback?

Mr. Torrie: We are assuming the Ontario Hydro standard costing, which means that if we can show something works at four per cent and whatever the lifetime of that investment is, then we put it in. We do not answer the question you asked; that is what this committee has to grapple with.

If as we believe there is a huge potential for energy efficiency out there, how can we get at it? What needs to be done to level out the playing field? Why is it we are not getting energy efficiency of two and three cents a kilowatt-hour when we know it is sitting there? Why is it that certain types of energy services are being provided to the people of Ontario at four and five cents a kilowatt-hour and being financed at four per cent real discount rates and 30- and 40-year amortization periods, while other types of energy simply are not getting the same conditions applied to them?

The question of how you even out the balance is the most important one facing this committee; it really is. You can do it with standards, you can do

it by incentives, you can do it with pricing--there are a lot of different ways. The way they did it in 1906, when they realized there was a huge potential of hydro power out there that was not going to get tapped, at least not in any way that would make it available to all the people of the province, was they created Ontario Hydro.

Charles is going to talk a little bit about the industrial sector.

Mr. Figuieredo: My presentation is going to be briefer than the other two for a number of reasons; one is that I see we are running a little behind time, but mostly there is not enough disaggregated information to do the kind of disaggregated study we would want to do.

Essentially, the problem is that Hydro's end-use model cannot give you--at least I have not been able to obtain--information on how the various industries are going to look in their end-use forecast in the end-point year. What we have done is an aggregate analysis on the whole sector. Some of the more detailed information we will be giving to the committee staff.

I am going to talk about what the sectoral efficiency scenario would look like, and John is going to put it in the context of the forecast and all those other things.

I want to remind you what the end uses are in the sector, because we apply our efficiency measures to them. One of the end uses is not up there because it is a very small term; it might called "electronic control, security, administration and such."

I hope I am not boring you with this information, but motor drive in industry refers to pumps, compressors, conveyers, mechanical motion systems and so forth. Lighting is self-explanatory. The category called "process heat and electrolysis" might be broken down into process heat on the one hand and electrolysis on the other hand. Process heat might include space heating, low-temperature heating or drying of materials, for example, and reactive heating, which would be medium- and high-temperature process heating. Electrolysis is the end use done in electrolysis cells and so forth.

To erect the industrial efficiency scenario, we obtained from Ontario Hydro the contributions to real domestic product made by various of the large consuming industries, and then took the energy output figures--also from the end-use model--and derived electrical intensities. This next overhead will show you what Ontario Hydro's electrical intensities look like in the base year and in the end-point year, which is the year 2000.

This is electricity used per unit output. Because different industries produce different kinds of products, which are measured in different units, we have used constant 1971 dollars to arrive at the intensities. You will notice in motor drive there is a rise in the amount of electricity used per unit output; the same is true for lighting and process heat and electrolysis.

Essentially, we erected our scenario based on what new efficiencies we thought might be possible in that sector. I want to stress that the figures we have used are very conservative in the sense that we have looked at the literature, taken the range of percentage savings possible and applied all the lowest ones to our scenario.

Another scenario that might be constructed, and we have done some work on it, looks at what the high-range scenario might be--how much less

electricity we would use in the high scenario.

Generally speaking, the kinds of things that are included in the low scenario are simply turning over old equipment for new. In the high scenario, things that might be included are, for example, not just getting more efficient motors but making the downstream part of the mechanical drive system more efficient, the baffling system and all that.

The next overhead is essentially the low scenario for the industrial sector, where we compare our scenario with Ontario Hydro's end-use scenario. After applying our conservation measures, we look at the kind of electricity use that will result in comparison to Hydro's scenario. In the low scenario, you will notice significantly less motor drive energy use, electrolysis stays approximately the same, lighting goes down, and process heat goes down.

3 p.m.

What is interesting about the Hydro intensities--this overhead shows Hydro's intensity figures for 1985 and the end-point year, 2000--is that, on average, there is supposed to be about a 20 per cent reduction in the amount of electricity used per unit output built into the end-use scenario. It is not apparent where it is. I gather from Ontario Hydro that a whole number of new services are coming in to mask the drop in intensity of the old services or, I should say more properly, to mask the increased efficiency of the old services.

Personally, I am very sceptical about whether there is conservation in Hydro's end-use scenario. I cannot see what list of new services would overwhelm that decreased intensity as a result of putting in more efficient processes and the decrease in overall electricity use brought about by substituting away from oil towards more efficient electricity. I do not know where it is. In overall terms, electricity-intensity--that is, electricity used per unit of output--rises by about six or seven per cent to the end-point year.

A little later, I will speak to some cost issues and talk about measures that were in the scenario. Now I will hand it over to John and end by saying simply that the efficiency scenario makes no assumptions about how this conservation is going to be put in place. Essentially, it says that at the minimum there is this much conservation possible and that it is up to public policy to decide how that is going to be pushed forward.

Dr. Robinson: I want to turn to the third topic I mentioned earlier, a comparison of the results of the analysis you just heard about with Hydro's end-use forecasts, but let me begin by reiterating one thing Ralph said and one thing Charles said.

A question was asked about the comparison between the Hydro numbers and ours. The Hydro projection is essentially a prediction of what Hydro thinks is going to happen. Our numbers are not. Our numbers are an indication of what could happen if cost-effective conservation were implemented. Whether that will happen is what faces this committee.

Why is it that cost-effective measures for energy efficiency are not happening? There is a large body of literature on the institutional and attitudinal barriers and a whole bunch of other reasons. However, we are trying to do different things; so one would expect our numbers to be different from theirs. That is just reiterating what Ralph said.

Let me reiterate what Charles said. He assumes industrial conservation or efficiency results from replacing equipment as it dies. It is the normal lifetime; there is no new replacement. The savings you just saw do not result from any replacement of existing industrial equipment. Assuming an average lifetime of something in the order of the time remaining to the end of the century, basically we have a turnover of all that energy-using equipment in that period. The normal replacement with more efficient equipment--not even most efficient equipment--gives us the savings you saw.

Let us look at some overall results. First, to aggregate the sectoral results you saw before, you can see that we project total sectoral electricity demand at about 387 petajoules; it is the sum of the three green bars. That compares with Hydro's projection of 562 petajoules. There is a difference of about 175 petajoules between their projection and ours. To put it in perhaps more meaningful terms, the difference between our two projections in the year 2000 is about 42 per cent of the total electrical demand in 1985. There is rather a substantial difference there.

You can see the savings are relatively greatest in the commercial sector, as one might expect. They are also large in residential and less so in industrial, mainly because we chose the bottom of the range of efficiency increases for industrial equipment; if we had chosen a higher range, we would have had another 50 or 60 petajoules, if not more, of difference there.

I should emphasize that the number we come up with in the year 2000, the 387 petajoules, is below the uncertainty range in the Ontario Hydro load forecast, the 60 per cent uncertainty range you heard about. Remember, that range did not reflect any difference in efficiency. It was the same efficiency on the high, recommended and low. There were just changes in economic conditions. We chose the mid-range economic conditions. If we had done the same kind of uncertainty calculation based on different economic assumptions, different economic inputs, we would have had a range around our 387; the bottom would have been slightly lower than that, of course.

Before we turn to a discussion of the implications of this forecast for Ontario Hydro's system planning for load and capacity comparisons, I would like to turn back to Ralph again--only in part because we want lots of exercise today--mainly to talk about the costs and the employment impacts that might be associated with achieving the green bars, the efficiency scenario you see up here.

Mr. Torrie: We have only started into this analysis, but we have made some initial attempts to find out what the employment implications would be if you went out and spent $4 billion to retrofit houses in this province over the next 15 years and if you went out and spent another $2 billion or $3 billion in reducing the energy consumption of commercial buildings by about 40 per cent.

At a first cut, with the residential program, which I had up on a slide at about $4 billion, if it were spread out over the next 15 years at an annual expenditure of about $275 million a year, as far as we can tell from the direct and indirect job employment indicators associated with that type of investment--insulation and construction materials in general--you should be able to sustain around 9,500 to 10,000 jobs over that 15-year period for people who would be engaged in retrofitting those homes. In the commercial sector, we think the 40 per cent savings could be achieved for a total investment of $2.5 billion, averaging $166 million a year, and sustaining somewhere in the neighbourhood of 4,000 jobs over a 15-year program. The

employment implications of this kind of activity are quite significant.

In summary, the combined investment of about $441 million a year for 15 years in the residential and commercial sectors would easily sustain 13,500 jobs over that period, and possibly more. These jobs, I might add, would be dispersed throughout the economy and not concentrated in one particular place. One of the nice things about demand-side activity and demand-side investments is that there is no equivalent to the one-industry or one-resource town; this activity happens wherever people are using energy.

Dr. Robinson: I should mention we have a more detailed calculation of job impacts, but we were unable to complete it for technological reasons; however, we will be presenting some results of that in the material submitted to your staff.

Let me turn to what this all means in terms of system planning. This is going to be a rather simplistic, general analysis of the kinds of effects of the scenario we have been talking about in terms of capacity. Our results, as you have seen, are in terms of energy, not power; that is, we are measuring petajoules or terawatt-hours, not megawatts of capacity. You have to translate those energy savings into power savings to find out what the impacts would be in terms of building new electrical capacity and to determine the implications for peak loads and things like that.

What we have done first is we have compared our results in energy terms, in terms of average annual gigawatts of electricity. We have put the 1985 load forecast in average gigawatts in the red line. There is the roughly 2.6 per cent growth. The little green dot is our scenario for electricity demand in the year 2000. You can see a rather substantial reduction from the load forecast; in fact, a level of electricity demand that is lower in 2000 than in 1985.

3:10 p.m.

Despite the fact 250,000 houses become all-electric, which is much higher than Ontario Hydro projects, and despite the fact much of the commercial sector becomes all-electric, and we have quite aggressively electrified those two sectors, because of cost-effective efficiency measures we still end up with less electricity demand in the year 2000, even given fairly significant population and economic growth. Needless to say, there is no change in standard of living. This is not the "turn down the thermostat and put on a sweater" scenario; this is the "increased energy productivity making industry more competitive" scenario.

Mrs. Grier: Are you using Hydro's own growth projections?

Dr. Robinson: Hydro's own projections of total number of households, number of people, amount of industry, industrial output, etc.

Mrs. Grier: That is their most probable projection.

Dr. Robinson: That is right. That is the projection that underlies all the models they use for load forecasting, the economic and demographic energy model, the identification model and the end-use model. It is the projections that come out of the economics branch of the economics and load forecasts division that they use to be common for all their load forecasting.

Mr. Cureatz: Excuse me. You have "recommend" in the red and you have the green cross. Is that with the efficiency program?

Dr. Robinson: That is right. That is the sum of all the demands that Ralph Torrie and Charles Figuieredo talked about.

Mr. Cureatz: It not necessarily so. It is only if Ralph's program comes into effect.

Dr. Robinson: That is right; if we pursue cost-effectiveness. It is not a forecast. In other words, it is not a prediction.

Mr. Cureatz: That is what I am trying to say.

Dr. Robinson: This is a "what if?" If we go after the cost-effective efficiency, where would we get?

Mr. Cureatz: That is quite substantial.

Dr. Robinson: By the way, this simply echoes the dozens of studies of this type that have been carried out on cost-effective conservation in about 40 or 50 countries. Let me reinforce what I said earlier. The obstacles in getting from here to there seem to be much more institutional, logistical and attitudinal than economic. As Ralph and Charles pointed out, these cost less than supplying new capacity. The cost to build up an efficient economy is not more expensive; it is just not likely to happen in the view of Ontario Hydro.

Mrs. Grier: There are no technological barriers to getting that.

Dr. Robinson: We are assuming only existing technology. There is no new technology in any of the efficiency assumptions. Of course, one would expect that there would be better technologies. For example, in commercial lighting we see an increase of efficiency. We assume only the existing standard and not even the technological limit of today. We are assuming that which is less than the technological limit.

This is one of the areas where energy efficiency tends to be underestimated. There is a huge development of technology as well. Today's most efficient level is tomorrow's obsolete technology. There tends to be an improvement in our technological capabilities on the demand side, partly because for years we never paid any attention to it. There is a lot of good opportunity for technological development.

This difference is about 6,700 or 6,800 average megawatts. If we use a 68 per cent average system load factor and we do not have any other basis for using anything else on average, Hydro's own view is that some will be lower and some will be higher in strategic conservation. For the lack of any better number, we are using 68 per cent. At a 68 per cent system load factor this translates into 10 gigawatts, 10,000 megawatts of peak demand, 10,000 megawatts less demand. If the load factor were lower, of course, there would be even higher peak reduction.

To interpret this reduction, this 10 gigawatts, in terms of Hydro's system planning process, we need to determine two quantities. One is what Hydro calls its load-meeting capability. Taking just its existing committed program and its expected retirements, how much load is it capable of meeting over time, the capability of the system to meet that load given the committed program? That is essentially equal to the committed capacity minus retirements minus the required reserve, because you have to have a reserve for reliability reasons. If you subtract those, you get what Ontario Hydro calls the load-meeting capability.

That is to be compared to what they call "planning firm load." That is the load you have to meet that is utterly beyond your control. It comes from the customers. That is essentially the primary peak demand you expect minus the interruptable load, because you can control that, minus the managed load minus the Bruce heavy water plant, where you can also control the demand if you have to. If you subtract those three quantities, you get the planning firm load.

On this next chart, the top blue line is Hydro's own projection of its load-meeting capability with the existing program. Darlington is built into here, but nothing after Darlington. The rise from 1985 to 1995 is not as great as it might be because there are some retirements. By the year 2000, there are no mothballed plants in the system, so this is a fully operational system in 2000, with Darlington in it. That is the load they can reliably meet.

Here is their load forecast for planning firm load. This should be in peak megawatts; that was a mistake. Their planning firm load is somewhat less than their peak demand. Their primary peak demand rises to something more than 26 gigawatts by the end of the century. In Hydro's own projection--this is from the 1985 bulk electricity system expansion plan with the 1985 load forecast added to it--we see that fortuitously, the load-meeting capability is about equivalent in 2000 to the planning firm load. We have a continuing surplus capability throughout the 1990s--this is the most likely forecast--and then by 2000 we are going to need more capacity. You can tell by the slope of these lines that they are going to diverge and new capacity is going to become more important after the year 2000.

This green dot down here is our planning firm load in the year 2000. You see a somewhat interesting pattern. Not only does the planning firm load not increase, but it also drops as the peak demand I just showed you did. The difference between the planning firm load and the load-meeting capability, which is large enough in the year 1985, grows. What we see here under the conditions of the efficiency scenario is that the surplus gets substantially worse. By the year 2000 we have a difference of 10 gigawatts, as I indicated before; 10,207 megawatts surplus capacity on the system. That is 10 over 16, so that is a fairly substantial surplus capacity.

Mrs. Grier: Does Hydro concede there is that surplus now? In their presentations to us, we heard about shortages and that there was no surplus.

Dr. Robinson: These two are Hydro's own numbers. This is the load-meeting capability out of the 1985 BES plan. In that plan, they used the 1984 load forecast because the 1985 was not yet out. I have put in the 1985 load forecast with the 1985 system plan. Those numbers come directly from Hydro documents and they see this surplus load-meeting capability.

If we do agressively pursue the efficient options and if we do end up even in the direction of this green cross, what we see is the surplus load-meeting capability growing. Even without Darlington, we would still end up with a substantial surplus capacity if this scenario were pursued and if it were successful. Even if we assume, as Hydro likes to point out, that we cannot count on 100 per cent penetration of these kinds of activities, this gives us a fairly big range. You have to assume pretty low penetration before you do not run into trouble with surplus capacity.

3:20 p.m.

Let me end with a couple of conclusions. These emerge directly out of what we have already said. The first is that even based on the fairly

preliminary analysis we did and given the data limitations we had, the potential for cost-effective savings relative to what is expected to happen by Ontario Hydro is very large. Moreover, the costs look low or comparable relative to new supply. The impacts in terms of employment seem to be pretty positive.

If these savings turn out to be what happens for reasons beyond the control of the utility, either by provincial or federal government mandate or because the marketplace becomes more efficient in delivering energy efficiency, causing this potential to be met in part, Hydro will be in a bit of trouble. It will have a large surplus capacity problem with the attendant financial problems that will cause both the utility and the ratepayers.

If some of this efficiency potential happens by itself, there will be fairly strong implications for the utility. However, if Hydro is right and none of this is what Hydro calls natural conservation, none happens by itself, we will be missing the boat if we do not do something about it. These numbers reveal that the potential is there. If it is not going to happen by itself and if we do not do anything about it, we will be missing the opportunity to create a more efficient system, a lower cost system, and therefore a more efficient and competitive economy in the province.

The Vice-Chairman: As you can see, we are running a little late. We have only about 13 minutes for questions, so please try to keep them as brief and specific as possible.

Mr. McGuigan: I am thinking of an application of my own that may be unique. It is a 15-horsepower motor running an ammonia compressor for a cold storage. The motor is about 40 or 50 years old and I do not see any reason why it should not run for another 40 years. In that case, why do you assume I am going to replace it?

Dr. Robinson: You should replace it only under two circumstances. One is if it breaks down and you cannot repair it cost-effectively. If you do that, you should replace it with an efficient motor, assuming that the marginal cost of doing so is either negligible--in other words, the efficient motor is available for roughly the same cost--or the extra cost of doing so would be paid back very quickly in savings. That is one set of circumstances where you would do that. That is what we mostly assume for the industrial sector, that at the end of their normal lifetime they would be replaced by efficient motors. We did not retire them early.

I cannot speak about your motor; maybe Mr. Figuieredo can comment more specifically. However, it may be the case that even though there is some useful lifetime left, you would still save money by having a more efficient motor, in that your savings would more than pay off the cost of buying a new one earlier than you would have. It has to be replaced at some point. You are talking about doing it sooner in that case. You need to cost that out.

You have put your finger on one of the big barriers to the efficiency we are talking about. People know the potential is there. They know their houses could be more efficient, but they do not necessarily know who to go to or who to trust or believe. They do not have any projections of what they are going to save or what they should do. That is a question of delivery mechanism. Ontario Hydro was put in place to do that for electricity and that is what is typically missing on the energy-service market. There is a lot of information, but you do not know where to get it or how reliable it is. In either of those circumstances, presumably you would put in a more efficient motor.

Mr. McGuigan: About two years ago the bearings burned out on it. We caught it before it did any damage. I was talking to my son about it, conscious that there was supposed to be a more efficient motor. I asked a contractor about it and the contractor came back and said, "Just put new bearings in it."

Dr. Robinson: It is a problem. I can remember going to buy a washing machine and dryer and asking about the Energuide label. The salesperson in the store, which shall remain nameless, said: "Do not pay any attention to them. They do not mean anything." That is a program that saved $1.2 billion in electricity. It is a real problem. This is precisely why we are saying you have to have some means to realize this potential. It is out there. It is going to make us competitive and it is going to save money, but it is not necessarily going to happen without some strong political will.

Mr. McGuigan: Given that inertia, I wonder whether you are going to get those natural savings.

Mr. Torrie: They do not make motors like that any more and new motors do not last 50 years.

Mr. McGuigan: There are not many of them around.

Mr. Torrie: I do not know how many are around. Given the rate of growth in our economy in the past 20 years, most of the motors are less than 50 years old and will not be around 30 years from now.

Mr. McGuigan: They have been in cold storage plants. The big, open motors that were made at the turn of the century are still running.

Dr. Robinson: The key issue in the future is what you decide you want to make happen, and for what reasons. If you want to make a nuclear power system a reality you invest a bunch of government money, initiative, etc., from 1945 until the present and make sure it happens.

Mr. Torrie: There is a technical thing. What happened with electric motors is that when the price of power started going down, they started taking shortcuts. They were made with cheaper and lighter weight materials. The motors that were built during the early years of power development were incredibly solid, heavy devices. A lot of corners have been cut. The efficiency of motors has actually declined in the past 20 or 30 years during an era of declining power prices. It was not a factor in design; they found they could put the initial cost of the motor down by cutting corners. So what if it meant they used a bit more electricity. Electricity was cheap. Now I think you are quite lucky to have the motor you have.

Mr. McGuigan: The contractor was probably right in telling us that.

Mr. Torrie: I would hang on to those old motors.

Mr. McGuigan: Where do we go for the more efficient ones you are talking about?

Dr. Robinson: From what Mr. Torrie is saying, you are possibly already more efficient than what you would buy if you did not pay any attention to this. On the other hand, there are motors around that are much more efficient than others. It is the same with residential appliances. You can walk in a store and see a wide range for the same service delivered, with

the same size of motor. Right now, because of the lack of any kind of delivery infrastructure, it is caveat emptor. Every buyer has to dig around for himself and find out what he can. They are at the mercy of what they learn.

One proposal has been that we need a delivery mechanism, and perhaps Ontario Hydro is the one, that is going to give reliable, up-to-date information on efficiency in a way that can be trusted because you know the institution will be there next year. It is not a fly-by-night and it has the resources to do the technical evaluation. With that kind of infrastructure you start to find that the delivery problem becomes much less. The penetration rate problem Hydro keeps talking about is reduced if you have a mechanism in place that allows you to make those things available to the consumer.

Mrs. Grier: If I recall your slides, you found the least potential for conservation in the industrial sector.

Dr. Robinson: We were most conservative, to use a term used earlier. There was a range of potential for replacing equipment and we took the bottom end of the range instead of the high end.

Mrs. Grier: Let me finish my comment because I want you to comment on what we heard from Ontario Hydro a couple of times. For example, there was the recent announcement about the expansion of the General Motors plant in the east. This was related to the availability of power, that if we expected those kinds of developments in the future, electricity was essential. Do you have any comment on improved efficiencies or whether electrical intensity is increasing in industries such as that?

Dr. Robinson: I think Mr. Torrie made a comment on Friday about the value added. As a proportion of value added in the automotive industries, electricity is extremely low. It is several per cent, so its importance in terms of the overall product does not seem to be very high.

3:30 p.m.

Mr. Torrie: There are two components, two issues for someone who is thinking of locating a plant and looking at the power supply. One issue is reliability of power supply, which is very important to almost all industry, and the other is cost. It is the first that is by far the most important. There are only a handful of industries for which electricity is more than about 1.5 per cent of value added. I do not believe a company like General Motors of Canada would base its decision to locate in Ontario on the cost of electricity being this or that.

There is no question that reliability of power is the drawing card in this province. Obviously, it is reliable and it is going to be that way for a number of years. Cost is a factor for aluminum plants, for abrasives and for a number of individual industries. For most industries, however, the cost of all energy is not that high and the cost of electricity in particular is less than two per cent of the value added.

I think one should look for substantiation of such claims. I would be interested to see substantiation of a claim that the cost of electricity was somehow a factor in the siting of that plant.

Mrs. Grier: We heard from Hydro some description of the consultation process that has gone into its demand and supply options study. Have any or all of you been part of the discussions and consultations with Hydro?

Mr. Torrie: I have never been contacted by Hydro in connection with any of its public consultation programs.

Dr. Robinson: That being said, Hydro staff have been exceptionally helpful. We could not have done this study without the data they made available. We had very fruitful contacts with individual staff members about the meaning or interpretation of numbers. There has been no problem from an analytical point of view in that respect.

These things go on at different levels. There is the way public consultation looks to the chairman's office versus two levels down versus deep in the bowels of the organization, which may be a little different.

The Vice-Chairman: Is there anything further? If not, thank you very much, gentlemen.

To get back on schedule, our next witness is Dr. David Brooks. If you turn over the next page, you have a brief background description on the basis of his topics. One of the handouts you had in the last while was based on Dr. Brooks's presentation.

MARBEK RESOURCE CONSULTANTS LTD.

Dr. Brooks: My name is David Brooks. I am currently with Marbek Resource Consultants Ltd. in Ottawa. My background in energy conservation starts from when I was the first director of Canada's office of energy conservation. Over the course of the history of this committee in its various terms, this is perhaps the third or fourth time I have been here. In one way or another the message has always been the same. In its broad lines it parallels what you heard just now from my colleagues in other studies, Robinson, Torrie and Figuieredo.

I want to talk today about specific examples of certain of the conservation potentials and why they are not happening, what is getting in the way. I will be basing this on a couple of studies my firm has done for either the federal Department of Consumer and Corporate Affairs or the federal Department of Energy, Mines and Resources. They are policy studies that look at the options for conservation and the barriers to conservation and try to suggest what you have to do in order to see that some of this potential can be realized.

In regard to what I put up on the board you have in front of you, I prepared the part on appliances and the part on lighting was prepared by my colleague Brian Kelly. We used slightly different formats. I gave you more of the talk and he gave you the slides. We did not quite get it together because we have only seen each other two days in the last month. We had a little trouble putting our system together. We will start with the appliance presentation and then go on to the talk on lighting. I expect to talk for about 20 minutes, so there should be plenty of time for questions.

These are the studies I am talking about. They have all been done within the past year. They focus on the Energuide program to which I believe John Robinson referred. This is a federal program that developed a common testing system for the energy use of a range of common household appliances: refrigerator, range, dishwasher, clothes washer, clothes dryer and freezer. The program cost the federal government one person-year and $500,000 per year.

To get even that small budget, they had to build in a sunset clause which caused the program to formally end at the end of March. The program

ended seven days ago now. However, as I will explain, it has been kept in place, although without any mandatory provisions. It is formally still mandated but there is no enforcement procedure at the moment.

Mrs. Grier: Is there any money?

Dr. Brooks: There is no money available for the program at the moment.

These are interesting studies in how the federal bureaucracy is working. Starting about a year ago, a year and a half before it ended, the Department of Consumer and Corporate Affairs asked for three separate studies, mainly based on interview and survey techniques.

The first study was a technical one done by A. D. Revill Associates, an engineering firm located in Belleville. They looked at the technologies and concluded that very substantial gains had been made in appliance efficiency, but that, except in refrigerators where substantial gains were yet to be won, there were no large new gains in appliances. This is something with which I will disagree later on, but that was one strike against continuing the program.

To the horror of the Department of Consumer and Corporate Affairs, the legislative module, by a firm named Hushion, Patterson, Milligan and Co. in Ottawa, found that the federal government had no legislative authority to enforce compliance. This was a particular concern because a number of firms, notably Brick Warehouse Ltd. and some other discount houses, had refused to put on the appliance labels. They said, "Nothing doing." Discount houses have been the single largest opponents of the program. When we interviewed them, they were very frank: "The last thing we want any consumer asking about is the quality of a product. That slows things down. We want to deal strictly in price. If consumers ask about such things ~~as~~ energy efficiency, it slows the sale down." From their point of view, they were against it.

3:40 p.m.

The legislative module concluded that probably--not certainly, but probably--the federal government had the right to insist on labels for appliances delivered in interprovincial trade, but anything that was manufactured and delivered within any one province was probably ultra vires. The case in point is Ontario where most of the manufacturing takes place and a good deal of the sales. This made the Department of Consumer and Corporate Affairs very nervous because it potentially challenged a lot of other labelling legislation. They did not want their whole house to come down because of Energuide.

The study by Marbek was the analytical part of the thing. It was quite a bit broader than the other studies and included the attitudes of the stakeholders, the structure of the industry and the economic potential, as distinct from the technical potential. We reviewed the testing procedures and the rating procedures, as well as the labels and various options to the labels. We looked at a number of alternatives to the program. Should you add appliances? In particular, should you add heating equipment? Should you take away some appliances? For example, if it is true there is no potential in a clothes dryer, should we drop it? What about other alternatives such as efficiency standards?

We found the program had quite a mixed record. Nobody denies that in the years since the Energuide program was established--and its counterpart in the

United States, the EnergyGuide, which is a rather similar program--the appliances available on the market have improved immensely. Whether you want to assert cause and effect is another question, but the two things have happened. There was appliance labelling and appliances improved, so much so that the worst refrigerator on the market today is better than the average refrigerator at the time the program started.

Mrs. Grier: How long ago did it start?

Dr. Brooks: Five or six years ago. Five years ago in April. Over this time consumers have saved more than a billion dollars. In particular, there have been very specific gains to public housing authorities or any group that puts up and pays for the utilities. They are among the strongest supporters of the program.

The label itself is very widely recognized. If I just say the Energuide label, most of you will have immediately a picture in your head of a red, or in some cases black, label that is on the appliance. Admittedly, most people do not use it but they do recognize it. It has that "seal of approval" kind of thing. It is an interesting anomaly that people recognize it but do not use it. A few retailers have made a point of putting it in their advertising, notably Sears. If you look in the Sears catalogue, there is a facsimile of the label beside each unit. They are real supporters of it, but that is not common. Most retailers have not done that and the discounters find it a real pain.

As a result of operating the system, a committee structure has been established that brings together consumer groups, retailers, manufacturers, trade associations and laboratories. These are Energuide committees that go by such acronyms as Scopep, Standards Steering Committee on the Performance of Electrical Products and Tecpep, Technical Committee on the Performance of Electrical Products. They have become remarkably useful forums for discussion and operation of programs and are now being widely copied around the world.

We have established testing protocols. The ironic thing was that almost everybody was testing for appliance efficiency. Almost everyone wanted to know how much their appliances used but everyone tested to a different standard. For example, how do you test a refrigerator? What is the temperature of the room in which you put the refrigerator? How many times do you open and close the door? There are innumerable ways. It does not matter much which way you do it; you just have to have one way. That has been established.

The program has some real failures too. It has not drawn the attention of most consumers, apart from the public housing authorities. In most cases, retailers know little of the program and sales staff are not encouraged to use it. I believe John Robinson related his own personal experience and I think everyone has had similar experience. This adverse reaction is helped along by the fact that, in general, a smaller appliance consumes less energy. There is a relationship between larger capacity and energy use. The commissions go up with the size of the appliance and they also go up with the number of doodads on it, such as ice-makers and juice-makers, all of which increase the energy consumption. The sales staff has a built-in incentive to get you to forget about the Energuide label.

Bureaucratic support has never been generated. It has always been an orphan in the bureaucracy. The Energuide staff have never defined its market. They have put out an Energuide directory, not realizing that the kind of information producers need is different from that which the sales staff need,

which is again different from that which the consumers need. They have been remarkably inept in producing information.

We came up with a balance and the Department of Consumer and Corporate Affairs came up with a balance. As you will see, the balances are quite different. If you take the two top lines, you will see a change in emphasis, but at least we agree the program has been successful until now; we think more so than they, but no one is fighting about the past. However, while we saw some problems in the future, we concluded there were substantial reasons to continue the program, although not necessarily in its current form.

We also concluded, contrary to the views of the technical consultant--which is a strange thing for a bunch of economists and biologists to do--that the technical people neglected the potential that was being identified in American studies. I did not have a chance to look at Dr. Rosenfeld's material, but he may have mentioned some of the gains that are projected, including the fact that California utilities are projecting 50 per cent gains in many appliances.

We also felt great errors were made in neglecting what you might call nonmarginal changes. You do not have to dry clothes by slugging heat through them. You can dry clothes with microwave radiation, for example. There are other techniques of this kind. You can wash dishes with jet streams; there is a tradeoff between the volume of hot water you use and the pressure of the water. Such techniques could vastly reduce the energy use by going to a different technology, but that was not taken account of.

We felt there were very good grounds for including space and water heating equipment; in fact, we would say the program was misconceived from the start in that it focused on those appliances that use about 15 per cent of the energy in the house and neglected those that use 75 per cent. There was real potential for doing this.

There is a need for something such as Energuide in other programs, such as the R-2000, which is the energy-efficient house program, or Ontario Hydro's own Enermark program, which is a very forward-looking program. I should say that Ontario Hydro, along with most Canadian utilities, has been very supportive of Energuide and has continually written strong letters to say, "If there is any program that makes sense, this one does."

We were struck by the fact that testing for energy efficiency is now a common thing and that there were no significant costs that could be saved by cutting the program; that is, everyone was going to continue testing. The major costs do not lie in the federal government in that $500,000 and one person-year. The major costs of the program lie in the fact that manufacturers have to test and certify, but since they have to do that anyway, the savings to society were slight. You could shift the costs from one stakeholder to another, but you could not really reduce the cost of the program.

Finally, we found there was a lot of market failure. Despite the potential out there, it was not being realized and, therefore, there was a need for a continued government program.

3:50 p.m.

While the Department of Consumer and Corporate Affairs did not buy our results and did cancel the program, it concluded there was not much more to be gained, except with refrigerators; we were in a climate of deregulation, and

somehow the department conceived of a program of consumer information as a form of regulation. They said consumers and retailers were not very interested. We agree with the statement, but we say that is a function of not providing them with the right kinds of information.

Some retailers object. That is absolutely true. They said market incentives would be adequate. We of course challenged that, and they said enforcement procedures are unavailable. They may be right, but if so, both they and the province cannot have the same argument. One or the other has to accept that the buck stops there. One or the other has the authority to insist on labels.

What happened then was that the Department of Energy, Mines and Resources was appalled at what was happening. Pat Carney, the Minister of Energy, Mines and Resources, said to Michel Côté, the Minister of Consumer and Corporate Affairs, "Even if you must take away all of the money, leave the regulations in effect until we can consider whether we want to get a program going." They came to us then and said: "Would you look at a program for us? Would you see what kind of program might make sense?"

We developed a program based on these conclusions: There was essentially unanimous demand for standard testing procedures, protocol, so everyone tests to the same standard. There was a demand for some kind of regular reporting system, not necessarily a consumer information program but a regular reporting system--in a sense, all producers want to know what the other guy is producing, and all the retailers want to know what everyone else is doing--and for continuing the committee structure.

There was some support. Utilities and consumer organizations wanted consumer information. We said the potential technical gains were understated but there was a worldwide trend to these kinds of systems; to drop Canada out of the system now was going to be very dangerous and, in particular, our Canadian appliance manufacturing industry--albeit largely foreign owned except for freezers, which is a true Canadian domestic industry--even as a branch-plant industry, was significantly at risk, particularly from Japanese imports.

There are grounds for thinking the Japanese are about to do to appliances what they did to the automobile industry. This is not because they are producing miniatures; they are now producing North-American-sized appliances that are coming in at what looks like 30 per cent to 40 per cent less energy consumption. It is a little hard to tell, because they use a different testing method from ours, and for some reason no one seems to have taken a North American appliance and put it to a Japanese test or taken a Japanese refrigerator and put it to a North American test.

Dr. Rosenfeld: That is not true. We just bought 20 Japanese refrigerators.

Dr. Brooks: Who is that?

Dr. Rosenfeld: We are testing them.

Dr. Brooks: You are testing them now? Good. I am delighted to know that. We will finally get some good results.

We went through a number of options. I am going to skip table 1, which you have; it goes down through the range of policy choices. Essentially, the system consists of three components, a consumer information system. It

consists of the establishment of a standard, a testing and rating method and then an information dissemination method, and you have options in each of those. We ran through the range of options, and no one favours anything less than the common testing method and the periodic reports. Some people favour a much more activist government program.

In looking at the world we were facing, we looked at the options. For all the reasons we have stated, we did not think that relying on the market made much sense. We said that if you are going to have an Energuide program, there are four basic variants. You can have a government program or you can have a privatized program, and you can just stick with the current appliances or you can include heating. This does not mean just any heating equipment; it could include space and water heating equipment. Those are the four big variants. There are little things you could do; you could add or drop an appliance here or something, but these are the big four.

Looking over what real options were today, it was clear there was not going to be a lot of federal money. If you could not even get one person-year and $500,000, you were not apt to get a large government program. We developed a program here. We said, "Privatize the existing program"--that is, shift most of the cost to private individuals and private firms--"but do include the heating units."

When we do this, two things keep coming up. One is that the federal government cannot drop out of the picture entirely. No matter which of the options you choose, no matter how privatized you go, there continues to be a substantial federal role. Whether they bury it in their budget or otherwise, the feds are needed initially in the developing of the standards.

There is an initial cost to get the thing going. The initial cost is largely paid in the case of residential--the electrical appliances--but as you go to the heating appliances, there are costs. We do not have a common standard. In particular, we do not have a standard that allows one to compare easily among electrical heating, gas heating and oil heating. Typically in Ontario we have all three options open to a new home, and the householder has a very great problem comparing the efficiencies across this. Eventually, of course, he wants to convert back to dollars.

There is an initial cost, and a continuing government role will be needed at least to subsidize the infrastructure and to serve as sort of an honest broker to accredit laboratories. We do not need what we have now, which is government subsidization of the Canadian Standards Association to do all the testing. That is a workable system; I do not mean to say there has been anything wrong with that system. But if you are going to privatize, obviously you have to break that down and give people the right to go anywhere to get it tested. The labs have to be accredited; so you drop back to some government role.

The second point is that there is a clear association between spending more money and getting more benefits. We cannot be too specific about how the benefit-cost curve goes, but it is moving upward. The more you spend, the more you are going to get; it is very clear in the heating area. It would be almost costless to include electrical heating devices in the program. You could bring them inside the Energuide program at very low cost, but since they are already relatively efficient, the gains would be relatively small. There is a substantially greater cost to bringing gas and oil heating equipment into the program, and particularly to bring them in in a commensurable way, but the potential gains are much larger. Of course, when I say this I am thinking more nationally than I am just for Ontario.

4 p.m.

To move quickly along, we also suggest there are reasons to move from here and to look at supplementing Energuide with minimum efficiency standards. The reason is that there is not just a large but an increasing share of appliances that are not purchased by the people who use them. They are purchased in bulk by builders, developers and apartment house builders.

As you know, the trend towards multiple-family units is large. Canada has always had a large rental population, substantially larger than the United States; these people do not buy their own appliances. I know of not a shred of evidence to indicate that developers care anything about the energy efficiency of the units they put in, because typically the tenant pays the electrical bill. He may not pay the heating bill, but typically he or she pays the electrical bill.

The need would be to have some kind of standard. Ironically, while there is no evidence that builders do look at energy efficiency, some surveys have indicated they would be delighted to be forced to do so if there were a minimum standard. They have said, at least in response to surveys--maybe they want to feel like good citizens when they answer surveys--they would be quite willing to accept it.

There are some other options that are worthy of consideration to get around the market failure. You could have limited minimum standards. In other words, you can have minimum standards that apply only to bulk purchases; they do not have to apply to retail purchases. You could have utility rebate programs. This is where the utility actually offers people money to buy a more efficient appliance on the basis that if the utility can save capacity, that is worth something to the utility. A variant on that is to offer the bonus, not to the consumer but to the salesperson. If you want to get an incentive built in to sell more efficient appliances, offer the money to the person selling the appliance.

Builder information, consumer information--all these are things that deserve consideration as policies. They would be, in Hydro's terms, all forms of strategic conservation, things that will not happen naturally because of price but that need supplementing.

Let me talk quickly about lighting. Here again we are talking about a Marbek study. Up to now we have been looking at residential appliances. We are now switching sectors and technologies. We are looking at commercial structures and lighting.

We were asked by the Department of Energy, Mines and Resources to look at market penetration rates for high-efficiency commercial lighting. Again it is a national study. We were asked first to define a technology to look at. This is a model. We wanted to see what was happening in one area; so we chose the range of technologies you see here.

We chose fluorescent lighting; that is the most common. We looked at energy-efficient lamps--that is, the tubes--and at the ballasts. The problem with fluorescents is not to keep them lit; it is to get them lit. In effect, you have to kick them to get them started, and the ballast is something in there that gives a jolt to the system to get it going. We also chose better reflectors and then a really new, high-technology approach called a light pipe, which takes outside light and in effect delivers it to interior space.

I am going to be talking about only the first two of these, because they are simple retrofit technologies; they can be applied much short of the life of a building. Building in light pipes is not clearly cost-effective, even in a new building, and it is a new technology. We put it in there just to have a variant on this. The reflectors are also much more difficult to retrofit.

We are also looking at a couple of markets. We are looking at office towers. We divide them into two groups: private and government, obviously because of the different incentive structures for the two.

I will go through these next two slides very quickly. This is the range of lamps. You have these in your packet. These are to show the range and the savings we are looking at. These are all readily available. The trade names are on the left, and we can provide more details. They are ways of saving energy in the lamp system.

By the way, in the study we are not looking at different ways of lighting the building. Many of the studies you will have looked at go much beyond this. We are in effect taking out something that is up there and putting something else in. We are not going to, say, lower lighting levels. We are not looking at different ways of lighting, such as task lighting. We are sticking with the system of uniform, common lighting--what you have now, just doing it better. Similarly, we are looking at a range of ballasts, such as energy-efficient and electronic ballasts--different ways of giving the system the kick you need to get a fluorescent tube lit.

In the packet, the next two sheets give you some idea of the size of the market we are dealing with. It is a lot of square metres of lighting every year just in new construction. Tubes wear out on a regular basis; the lifetime of the equipment we are talking about is much less than the life of the building. A substantial number are replaced every year at a fairly regular rate. Every year there is a market for each of these appliances.

If you go through a simple cost-effectiveness calculation, checking in the most simple way possible the payback method for energy-efficient lighting and ballasts, you end up with a payback of something like five months for replacing the existing tubes with these new, more energy-efficient ones. The payback for the ballasts are a little bit longer, one to two years, but are still pretty impressive.

With paybacks of four to six months just from relamping, we find we are picking up about a quarter of the market, maybe increasing it by one or two per cent per year. No one is quite sure. The sales figures on these are hard to define, but they are not very impressive for something with such a high payback. The energy-efficient ballasts, with admittedly a longer payback, are picking up only about five per cent of the market.

You can appreciate that replacing reflectors is a somewhat more complex task and does involve added labour. The others essentially involve no added labour because it is only happening at the time you are doing it anyway, but replacing reflectors does have added costs.

It is just not happening. What is getting in the way? Why is this happening? That is what our study is about. These are the reasons we have defined, and we are trying to define which applies where. I should say that the studies on appliances are completed; we are still only about halfway through this one.

The fact is that electricity is still cheap, particularly in Ontario. I automatically double any payback periods on numbers I get from the United States. If you look at a typical report from the United States, generally they are dealing with seven-, eight- or nine-cent electricity. When we look at a US payback figure, just as we take the usual one tenth--if we want to know how much we consume in Canada, we take the US figure and divide by 10; that is the back-of-the-envelope way of doing it--the back-of-the-envelope way of making a payback from US numbers of electricity is to multiply the payback by two because our rates are about half of theirs.

Also, a lot of people are not aware of the options. Even for those who are aware, there are just so many models out there; there is a lot going on. The lighting field is changing so rapidly that you are like a home owner who is told: "You ought to retrofit. Here are the 35 things you might do. Think about them. Choose which ones you would like to do. Tell me which order you want to do them in and when, and then we will get started." It is quite a complex field, and it is easier just to do what you have done in the past.

4:10 p.m.

There are some technical concerns. There are some problems with certain ballasts. We find there is an enormous range in the sophistication of building managers. The top set would apply to almost anything, but when you get down to the really big ones, there is the split incentive again coming in here where, in most cases, utility costs are passed through to the tenant one way or another, but the tenant has no control on the investment in energy efficiency. In this case, you often have three. Where you have an owner, a manager and a tenant, you get very complex incentive structures that almost lead to incentives for inefficiency.

When electrical contractors are putting up buildings, they are often trying to put in the least-cost system. They are bidding on their costs and not efficiency, although occasionally you can get this turned around where in certain circumstances you can get people bidding on efficiency. Then some peculiarities of the tax structure make things worse.

What can we do about this? A range of options can be considered. When there is a market failure, there is an a priori rationale for at least considering government action. Something beyond market failure by definition means the price system is not working for you. You have to think of what else you might do. That is not to say that government action will be warranted, but it has to be investigated.

A simple approach is to ban conventional fluorescent lamps. The problem with that is there are places where they are really needed. In some areas they are the best thing. Efficiency standards are possible here, just as they are with appliances. In the packet I gave you, I went through advantages and disadvantages of standards; you have to balance the two. Again, there can be rebate programs. Utilities could establish model tendering or innovative lease systems just as there are models for ways to distribute the incentives better and inevitably improved information and training.

I suspect that Marbek has been more involved in energy-efficiency information and programs than any other firm in Canada. The only single piece of advice we would suggest is that no one thing will ever do it for you. Almost always you need a collection of programs, and you need to supplement specific programs with information about how to use them. The information has to be available at the time people are ready to buy and it has to be product-

specific. It is not enough to tell the building manager that he can be more efficient with his lighting system. You have to tell him how, provide training and information in the terms he or she understands.

The point of all this is that in these fields, both ones of high electrical consumerism--and, by the way, both household appliances and commercial lighting are important contributors to peak loads as well as to average loads--there are major efficiency gains to be had. Those gains look unlikely to be realized by market signals alone. In any case, those signals are relatively weak in Ontario.

There appears to be good reason for government programs in this area. At a minimum, that provides standard methods of measurement, consumer, retailer and producer information. They may also require efficiency standards. It may also be appropriate for the utilities to think about systems that stimulate the demand as by offering a bonus to purchasers or sellers of energy-efficient equipment.

Thank you very much. I will be glad to answer your questions.

The Vice-Chairman: Thank you, Dr. Brooks. Perhaps if you sat down at the other end you would be a little more comfortable.

Mr. Snell: Can you explain model leases for us? I did not pick up what you meant by that.

Dr. Brooks: A simple example of a model lease is one that would pass through only half of the energy cost so the tenant has some incentive to turn off the lights because whatever he or she can save will reduce the bill; but since only half is passed through, the owner still has an incentive to invest in energy efficiency.

You can also meter more closely. For example, it is typical of most buildings that you pay energy costs simply on a square metre base; if you have one third of the building, you pay one third of the energy costs. An alternative is to meter separately. We know that separate metering in apartments works. There is reason to think that separate metering in office buildings would also work.

Let me use your question, Mr. Snell, to suggest how this might work in the government system. Obviously you cannot use innovative leasing, but you can use innovative budgeting techniques. For example, you can say to a government manager, "While it is true that if your energy costs go up it just becomes a line budget item and will give you more money next year, but any money you can save on your energy bill this year compared with last you can keep for three years and put it into other kinds of programs." You provide the unit using energy with an incentive to conserve energy as a tenant and then you would be able to put it into other programming. These are the kinds of innovative systems we are talking about.

Mr. Snell: In the private sector example, is the term "shared savings" the same thing as model leases?

Dr. Brooks: No. Ordinarily, "shared savings" refers to investment programs. It could be. There is nothing wrong with the literal use of the term, but up to now shared savings has meant that a firm comes in and says: "We will do the investment. We will retrofit your plant or building and we will get our return simply from savings in the energy. We will take 50 per

cent of the savings." You share the savings. It is normally an investment with a third party and not just between the two principals.

Mr. McGuigan: Dr. Brooks, you answered part of my question. You said individual meters in apartments do work. How does it work in the overall sense in savings to the tenant? Obviously, somebody has to pay for the individual meters as compared to the overall meter and difference in rates. How does it work in terms of the net effect on a tenant?

Dr. Brooks: I confess it has been a while since I have looked at individual metering studies. My recollection is that it has a reasonably good payoff for electricity. As I recall, it does not have a payoff for individual metering of heat; the building is too interactive. In most cases it is just individual metering of electricity. I could not be specific about how that would work without an electrically heated building. It might work well if there were individual air-conditioning, but I do not know offhand what the number might be on that.

If you are talking about the use of electricity for lighting and appliances, it works. Ironically, the bill often ends up being more because, you are right, they pay it a residential rate rather than a commercial or block rate, where the savings would be substantial.

4:20 p.m.

Mr. McGuigan: That is what I am coming to. I do not see much incentive in the program if the tenant is going to pay out as many dollars--or more--after the building has been retrofitted as before.

Dr. Brooks: The tailoff rate is--(inaudible) advised us when we argued for marginal cost pricing that it works nicely in combination with that, but it is not the focus of the testimony.

Mr. Gordon: I am a bit perturbed in a way. I listened very carefully this morning to what Dr. Rosenfeld had to say, and I was feeling rather optimistic about conservation. After your presentation, I have to say it sounds like it is a ship without rudder, maybe without even a steering wheel. I do not want the Hydro people here to be offended, but in a way I can understand why I suspect that Hydro as a utility is tongue in cheek when it hears people talking about conservation because I think it has yet to see that it has really taken off. Am I right in my point of view, or am I just dreaming in technicolor? Black and white is more like it.

Dr. Brooks: I will give you a good economics answer: Yes and no.

Mr. Gordon: You sound like us now.

Dr. Brooks: On the one hand and on the other hand.

Mr. Gordon: You should be brutally frank. In the light of what you have said to us today, it is pretty damning.

Dr. Brooks: Given the optimism with which I was the first director of the Office of Energy Conservation and where we are now, we are certainly nowhere near where I thought we would be. On the other hand, if you look at large, industrial economies such as Canada, the attitudes that were built into what one of my former professors called a cowboy economy in terms of its attitude towards resources, and in particular a unique Canadian wrapping,

which does not have a counterpart in the United States, of an electricity economy, in many ways we have not done too badly. Energy efficiency in Canada is substantially higher now than it was in 1973. That is the good news.

Canadians have shown they will react, and particularly in those areas where things are largely within their control, such as the automobile, there has been quite a remarkable turnaround. The energy efficiency of the Canadian automobile fleet--again I am jumping numbers out of my head--I believe has dropped from something like 22 miles per gallon, using the old numbers, to 17 on the average. That is quite a remarkable drop in 12 years.

Mr. Gordon: I hate to interrupt you, but it sounds to me that it might be the Japanese who will encourage us all to get behind energy efficiency in appliances and lights and so forth rather than our own Canadian people.

Dr. Brooks: Absolutely. But let me say that on the other hand it is not anywhere near where it could be in terms of cost. We are not being as efficient as we could be. I think it is because of countries such as Japan that I am much more cautious about regulation now than I was when I was with the federal government. Nothing has been quite so effective in improving the automobile fleet as the thrust of the Japanese industry.

I hope the Canadian appliance industry will get on the ball. I admit there is not much evidence of that, again with the significant exception of freezers. If you want to say that is the only Canadian industry, maybe there is a lesson to be read into that. The Canadian appliance industry is just not doing the research and producing state-of-the-art equipment. Maybe we do need a dose of good Japanese competition. I hope the industry can survive and not get wiped out in the process. There is enormously further to go.

The other thing to add in there is that there are these areas of split incentives, and to my knowledge no one has successfully resolved the split incentive problem; that is, in the simple case, the residential tenant who pays his own utilities. You rent a house and you pay your own utilities. No one has the incentive to add insulation. To my knowledge, no one anywhere around the world has resolved that problem without regulation or in the absence of government fiat.

Dr. Rosenfeld: Could I make one comment?

Dr. Brooks: Sure.

Dr. Rosenfeld: One thing I did not say about the program of Pacific Gas and Electric this morning may please you, Mr. Brooks. I said that Pacific Gas and Electric has 1,000 auditors. They go out and tell you what is wrong with your home. They will give you zero-interest loans to help you fix it up. That is the classic way it works for a private home owned by a single-family owner.

As David Brooks tolds you, Pacific Gas and Electric found that when it comes to tenant-landlord relationships, it does not work. In desperation, Pacific Gas and Electric went to the public utility commission. It said: "We cannot get landlords to even take out zero-interest loans on apartment buildings. It is cheaper for us to fix up the god-damned apartment buildings by paying for it out of the ratepayers' money, particularly for poor disadvantaged people, than it is to keep on paying these ridiculous gas bills and finding incandescent lamps burning 24 hours a day in hallways and so on."

Pacific Gas and Electric, at the ratepayers' expense, has fixed up something like 200,000 units in the Bay area. It just paid for them. It claims it is cheaper than trying to invest in new (inaudible).

Dr. Brooks: However, that is an oil-based system.

Dr. Rosenfeld: It is oil and electricity; they do everything.

Dr. Brooks: No. I mean their electricity is oil-fired.

Dr. Rosenfeld: It is more expensive than yours is. It is 10 cents for a kilowatt-hour of margin electricity. Of course, in Canada, the window of opportunity is smaller; I do not want to say it is not.

Mr. Chairman: Mr. Snell has a supplementary.

Mr. Charlton: I have one too, Mr. Chairman. Mr. Gordon was very specific when he said he was somewhat optimistic after hearing the presentation this morning and somewhat more pessimistic having hear yours. Perhaps you could both answer this.

The essential difference is that you have set out for us this afternoon the options that we as government have to look at to start having some of the things happen. The presentation from Dr. Rosenfeld this morning very clearly set out that they had already been through the process of looking at these options. They may not have adopted them all, but they have looked at these options and implemented some of them. If I recall correctly, in total, you were talking about the expenditure of somewhere in the neighbourhood of $250 million a year, specifically funding those programs. That is where the optimism came from that you felt this morning.

David, you set out some options for us. You saw the options as well, so perhaps you can comment on which ones were used and which ones were not in the case of Pacific Gas and Electric. From your experience, David, which of these options or which mix of these options would be most useful for us to have a look at?

4:30 p.m.

Dr. Brooks: Certain of the options, such as the information, should be national. Information programs are really not your responsibility. I think the Energuide program will be rescued. I think even the Department of Consumer and Corporate Affairs is having second thoughts about its precipitous killing of the program. However, it is much easier for a province to regulate than the federal government.

Beyond the information programs, there are three things that are definitely worth the committee's attention. The first is supplementary information programs aimed specifically at Ontario consumers. The second is the minimum standard that would apply, at least to bulk buyers, and that could be either lighting or appliances. The third is rebate programs. I am particularly intrigued by the rebate programs that are aimed at the seller rather than the purchaser of the appliance. I used the word "intrigued" deliberately. They seemed to me to be a good idea, but I have not seen a good analysis. Those are the three I would say deserve a lot of attention.

Mr. Snell: What were your comments on bulk buyers?

Dr. Brooks: Bulk purchaser; the developer who buys 1,000 refrigerators to put in a new building or development and in most cases defines them only by the size of the space he has available--he cuts out a certain space--and the first cost.

Mr. Snell: With respect to efficiency standards themselves on appliances, we have seen evidence that substantial gains are being made in California. On the one hand, prior to your presentation I was led to believe it was a federal jurisdiction. You presented evidence of a study for the Department of Consumer and Corporate Affairs that it has been advised it might not be within its jursidiction.

I am a bit confused. I do not know whether that provides an opportunity for the committee to recommend to the provincial government that it move into efficiency standards or just where we are at with this in an area where substantial gains are not included in the kinds of forecasts for savings that Ontario Hydro provides us with, yet there has been a lot of opportunity for the province. Where do we go on it?

Dr. Brooks: I cannot answer that. I can only recommend that you get that module, which has been published. This is all in the public domain. There is the legislative study that is referenced in my study. You can get it from Consumer and Corporate Affairs and look at it. They were certainly concerned whether the federal government had the right for intraprovincial sales, but of course that is the relevant one for Ontario.

Mr. Charlton: Perhaps I can comment on the question of standards and the federal jurisdiction. The legal question is not whether the federal government can set standards on stuff that comes in from outside; it can clearly do that. It is also not whether the federal government can set standards on stuff that is produced in Ontario and sold in British Columbia; it can also clearly do that. The question is whether the federal government can set a standard on something that is produced and sold in Ontario. Am I correct?

Dr. Brooks: That is exactly the problem.

Mr. Charlton: It is clear that in this case the province has the authority to set a standard.

Dr. Brooks: The other thing that could be done, if you look at this broadly enough, is to have a federal-provincial conference where everyone would agree to have the same standards or where the provinces would agree not to challenge the constitutionality of a federal standard. There are various ways of getting at this.

Mr. Brandt: I have a couple of questions. I am glad Professor Rosenfeld is still here because I had somewhat the same feeling after his presentation this morning, that there were a great number of areas of conservation we could move into. Then I got somewhat more discouraged. I am in agreement with the comments of my colleague Mr. Gordon in that respect.

First, would you say the United States, generally speaking or at least in some jurisdictions, is considerably ahead us in the area of conservation? Second, would you say that is a product of the kinds of conservation initiatives they have made--I am separating this for a moment--or is it a product of their electricity rates being in the range of double ours?

In other words, is it a straight economic question with conservation being a byproduct of the economics, or is it that they have taken the initiative? Do you believe the United States is ahead of us and can we be as aggressive as the US in this area, recognizing that we have cheaper electricity?

Dr. Brooks: Let me digress for a minute. I think this must be the first time in any presentation I have made since 1973 that I have been accused of being discouraging on the side of conservation.

Mr. Brandt: Do you want to make the presentation again?

Mr. Gordon: Tomorrow.

Dr. Brooks: I have been home for only two days. I think I would like to stay in Ottawa for a while.

No, generally I do not think the United States is ahead of us. I think Canadians have done pretty well, but as you qualified it in your sentence, some jurisdictions are significantly ahead of us. In those areas, it is not principally a function of price but of imaginative and forceful leadership.

The gains in energy conservation in Canada are not largely price-driven, although that is a relevant criterion. Where you set the standards is not independent of price. It is a very important criterion and an important measuring model. We have lower-cost electricity in Canada in part because we have cheaper electricity. It is not a function just of incorrect signals; our electricity is cheaper. However, it is less that than the quality of the leadership exercised by government or, in the case of an industry, by the industrial plant. You see differences among firms in the degree of enthusiam. You see differences in cities in the kind ~~of~~ leadership. It is a major government opportunity and a major point where government can influence the results by the attitude it takes and the signals it sends out.

Mr. Brandt: I have a brief editorial comment you may wish to respond to, and I would welcome comment. I am a pinch-hitter on this committee. I am not here on a regular basis so I have not heard all the presentations. The presentations and comments I have heard with respect to the cost of electricity in Ontario relative to the costs enjoyed by other jurisdictions lead me to the conclusion that, for the many warts and blemishes one might pick out in the Ontario Hydro operation today, and of course in past history, it must be doing and must have been doing something right over the years.

We do not have a natural resource for electricity in this province; we have about a one-third mix across the board in how we generate our electricity. For example, we are not blessed with the kind of geography that exists at the James Bay project in Quebec, which will produce very cheap electricity.

As we are looking at Hydro, let us make sure that we do not throw out the baby with the dirty bath water and that improvements are brought about in an intelligent and responsible fashion. In my view, Hydro has carried out a very capable track record over the course of the past number of years. One of the things we are enjoying today is relatively inexpensive electricity. That is an editorial comment. I just wanted to get it on the record.

Mr. Charlton: If we had 270 million people, how efficient would we be in terms of price?

Mr. Brandt: I did not hear that; I am sorry. I always want to hear what Mr. Charlton has to say because he and I go back a long time.

Mr. Charlton: You keep talking about low energy prices and how well Ontario Hydro has done. We have a larger land mass than the United States. if we had 270 million people in Canada, what would be the average electricity price in Ontario? If we had 90 million in Ontario, how well would we have done in terms of price?

Mr. Haggerty: It depends on demand.

Mr. Brandt: I do not think anyone can come to a specific conclusion on that kind of question.

Mr. Charlton: Let us not applaud too loudly what has happened fairly naturally.

Mr. Brandt: I question whether it has happened on a natural basis, because some decisions were taken. Now that we are getting into a debate, Mr. Chairman--and I did not encourage this, as you well know--the very mix of production of power in this province has been brought about in a fairly intelligent way to produce low-cost electricity. Enjoy it while you can rather than pulling the system apart at every turn of the road.

Anyway, I have a question.

Mr. Chairman: Mr. Brandt, get on with your question; Dr. Brooks has to leave shortly.

Mr. Brandt: I was trying to get to my question when I was interrupted by another member of the committee.

The Vice-Chairman: Get on with it, please.

Mr. Brandt: My question is with respect to the former seven per cent demand line. It was anticipated at one time that, almost on an ad infinitum basis, electricity demand would go up on a seven per cent annually compounded basis. I believe that has been reduced to the range of two per cent, if I can use rounded figures. What are the major components that have gone into that reduction, the approximately five per cent decline in the demand line? Can you give us your opinion as to what has brought that about? I have heard some theories, but I would like your views on it.

Dr. Brooks: You are getting my views and not my analysis. The major thing that has been involved is a decline in the growth rate for energy-intensive industry, particularly for electricity-intensive industry. The products of electricity-intensive industry have had a relatively flat demand in recent years; they have simply not been doing well.

A second thing is there has been a certain degree of saturation in the consumer market for new appliances. There is not much a consumer can buy that is new that is a net addition to his electrical requirements. The things that are new, say the personal computers, are not big electricity consumers.

I suspect the third factor--I would have to look at the numbers--is a decline in the share of conversions to electricity. There have been more options. The competition has been much hotter for the heating market, and I do not believe electrical heating has been growing the way it once was.

Finally, responsible for at least half of that difference, I would guess, are the efficiency gains that have been taking hold since the early 1970s.

Mr. Brandt: That was the question I was trying to get at, the fact that conservation activities have taken hold to a certain extent and that some real savings are working their way through the system as a result of these efficiency gains.

Dr. Brooks: Absolutely.

Mr. Brandt: I wonder where you would put that on the scale of the priorities of what has happened during that time frame.

Dr. Brooks: We often have to measure it as a residual, but it is a very large trend. Our priority guess is that is about half the differential.

Mr. Brandt: That is a little more encouraging than I had expected.

Dr. Brooks: I do not want to be discouraging. We have done quite well, but not nearly as well as we could have.

Mr. Chairman: I think you have answered that. Dr. Brooks has a train to catch momentarily to go back to Ottawa. We appreciate his attendance today and that of all the people who appeared before the committee.

The committee adjourned at 4:43 p.m.

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

THURSDAY, APRIL 10, 1986

Morning Sitting

SELECT COMMITTEE ON ENERGY

CHAIRMAN: Andrewes, P. W. (Lincoln PC)
VICE-CHAIRMAN: Asne, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
Cureatz, S. L. (Durham East PC)
Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitution:
Brandt, A. S. (Sarnia PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Mellor, L.

Staff:
Moore, L., Adviser, Electricity Section, Policy and Planning Division, Ministry of Energy
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

From the Rose Technology Group Ltd.:
Levy, Dr. A. W., President
Dixon, F. O., Manager, New Business Development, Consumers' Gas
Graham, G. B., Barrister and Solicitor; with Blake, Cassels and Graydon

Individual Presentations:
Dupuis, M., Galetta Power Ltd.

Argue, D., Senior Associate, Passmore Associates International

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Thursday, April 10, 1986

The committee met at 9:42 a.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: I see a quorum. Dr. Levy, Mr. Graham and Mr. Dixon are making presentations this morning. For the Hansard record, perhaps you can introduce yourselves as you speak.

ROSE TECHNOLOGY GROUP

Dr. Levy: My name is Alan W. Levy. I am the president of Rose Technology Group. I will give you a little background about some of the panelists. My background consists of some degrees in solid state physics and working in energy conservation in the United Kingdom for the British government. I came to Canada 10 years ago to work at the National Research Council on energy conservation. I got involved in consulting in energy management and then formed Rose Technology Group in 1984.

On my immediate left is Frank O. Dixon who works for Consumers' Gas and for Rose Technology Group. Frank's background is in chemical engineering. He has worked for Gulf, Ontario Hydro and Consumers' Gas. He has a background in fuel supply contracting, business development and strategic planning. On my far left is Gordon B. Graham from Blake, Cassels and Graydon. Gordon is a partner in that firm. He teaches commercial law at Osgoode Hall Law School and acts for major lenders and utilities, advising them for the past several years of activities that are of interest today in financing energy projects.

Rose Technology Group is what we call an energy services company. I will explain what that is in a moment. We are 50 per cent owned by a utility, Consumers' Gas, and 50 per cent owned by the four principals of Rose Technology Group.

We make energy-efficient investments in buildings and facilities. We have the project management capacity, the technical capacity, to look at a facility, to identify the potential for energy cost reduction and to arrange private financing if required to effect those cost reductions. Rose Technology Group is willing to assume the entire financial risk of those projects. We work in all building sectors, industrial, commercial and institutional, except for single family homes.

Because we are an energy services company, we are interested in cogeneration. That is what we are going to talk about today. Right now, Rose Technology Group is studying cogeneration as a business opportunity. We feel it is a consistent fit with the energy services business. By energy services, we mean building owners' ability to purchase heat, light and power at the lowest cost. We have the capacity to arrange project financing with the major institutional lenders.

We think cogeneration is of interest not just to our industrial clients but also to our commercial and institutional clients. From what we have seen

to date, we feel there is a potential, a business opportunity, for Rose in Ontario.

I will now pass our presentation to Frank Dixon.

Mr. Dixon: When the chairman invited us to come here a few weeks ago, we were asked to speculate about what type of environment would promote cogeneration. Let me start with our general conclusions from some of the thinking we have done in the past little while and from some of the discussions we have had with cogenerators in the United States. We see cogeneration as important and we see three environments that are required if we are looking for a development of cogeneration of significant size.

First, the government of the particular area should have an energy policy that puts a high priority on efficiency as opposed to looking at price or supply. There should be an emphasis on efficiency in the energy policy. As we have seen in the United States, governments should be setting some sort of framework for utility planning and should be supportive of private power. We have seen that at the federal level in the United States in the Public Utility Regulatory Policies Act. That environment seems to be required for significant cogeneration development.

On the utilities side, an important thing is some flexibility in the capacity addition plans in the planning process. In general, it is important to have an ability to offer capacity credit to cogenerators, not just energy. Even more important, in the small cogenerator sizes, there should be some standardization or streamlining of contracts in the interconnections.

9:50 a.m.

In the business environment, technically competent developers, owners and operators are important. Cogenerators are power plants that need to be handled by people who know what they are doing, especially if they are interconnected. Reliable hardware and good service have to be available. As in central generation, there needs to be a secure fuel supply because you are building these plants to last for a 10- or 20-year time frame. As Gordon Graham will speak to later on, there should be an availability of project financing generally.

We were also asked to think about the policy implications. We can see two general policy choices. I think we will just talk about those and leave it at that.

The policy we have now towards cogeneration is more or less predictive. We are saying cogeneration is viewed as an efficiency measure. We are estimating the quantity of cogeneration that will show up in Ontario and including it in forecasts of demand. There is not very much impact on central generation plans today as far as we can see. It is mainly the role of the utility, Ontario Hydro, to facilitate the cogeneration that comes along.

If we want to think about policy in a more proactive way as we have seen in the United States, cogeneration has to be viewed a little differently. Cogeneration should be viewed as both an efficiency and a capacity-avoidance alternative. Some measures are likely required to bring about some of the environments I talked about earlier. Some of the broader societal benefits that cogenerators bring need to be credited to them in some way. In this

policy environment, the government has a more active role. There is a role for the government and the utility to foster cogeneration.

Those are the general conclusions we came to in a couple of weeks of thinking about this. Now I would like to go back and support that with some of our experience and thinking about cogeneration.

Here are a few factors about cogeneration to describe the boundaries of the universe of cogeneration economics. There are six major factors that together have to be controlled for viable cogeneration projects.

Electricity from a cogenerator can be valued at anywhere between half a cent and 10 cents a kilowatt-hour, depending on where you live and what value is placed on that. On the thermal side, the thermal energy can be $5 to $10 per million British thermal units, depending on whether you are generating it from an inefficient boiler using an expensive fuel or an efficient boiler using a cheap fuel. The amount of thermal energy that is recovered from cogenerators can be as little as five per cent and make producing an economic project, but in most cases you are trying to design to 100 per cent.

Equipment cost has a broad range.

Mr. Haggerty: May I have clarification of one point? When you talk about cogeneration, are you talking about gas versus electricity?

Mr. Dixon: No. Perhaps I should go back and define cogeneration. Cogeneration means the sequential production of heat and electricty onsite. It is a technology that is widely used in the United States and Europe for generating electricity onsite, and its main feature is efficiency. You get a lot more BTUs and energy out of the fuel that is being used. If you have a requirement for heat and thermal energy, it is a very efficient means of producing electricity. That is what I mean by cogeneration.

Mr. Sargent: What is the range of fuels?

Mr. Dixon: The fuels for cogeneration can be almost anything depending on the system. They range from energy from waste, biomass--for a number of reasons, the predominant fuel is natural gas, but certain types of cogenerators require reciprocating engines and for that you need a liquid fuel such as diesel. Other cogenerators require a boiler and you can put almost any type of fuel into a boiler.

Mr. Brandt: Perhaps I can interrupt at this point as well. You mentioned the United States as one area that has been using cogeneration for some time. If you were to pick the most successful of those plants, can you give us some indication of where it is located and describe the unit for us?

Mr. Dixon: I have a couple of slides later on that are quite interesting. They come from a sort of search for excellence in successful plants and what the major operating success factors are. Perhaps I can leave that until I get to those slides.

Mr. Brandt: That would be fine. What I want to come to grips with is the size, the range, the location, the kind of environment in which they are established and those kinds of questions. Maybe we can leave them for when you get to that point.

Mr. Dixon: Generally, the most successful plants are in industrial

applications where there is a continuous requirement for steam. They are larger-scale plants.

Mr. Brandt: I was wondering whether it had to be in an urban environment, whether it would work in a more rural area, the proximity of the source of the heat and its applications, and those kinds of things.

Mr. Dixon: Cogenerators are principally heat-seeking devices. They go where the heat is being used at present. Industrial processes are where a lot of heat is being used continuously on a 24-hour basis. That generally produces some of the best economics for cogeneration. There are alternatives to that when you get to some of the smaller sizes in the urban and commercial applications.

Mr. Brandt: I will show my usual patience and wait until you get to that point.

Mr. Dixon: I want to sum up this slide. It shows there is a very broad range in all these things. Therefore, it is quite difficult to attach a standard cost to cogeneration. This is probably why you see such a wide variety in the estimates of economic potential for cogeneration. You have to pin down a lot of site-specific factors. It is complex.

Will you flip to the next slide, please? I want to put this up to illustrate some of the relationships between those variables and the way an investor may look at a cogeneration project. This particular one is for a project that would cost $700 a kilowatt, installed. It would have a one-cent-a-kilowatt-hour operating and maintenance cost. You can see that if you are above the line, you have a go project and it deserves further investigation. If you are below the line, you are not going to think about investing further in the project. The bottom axis is fuel cost. It is shown as gas price there, but it can relate to coal or whatever the energy source is. The side axis is the electricity value.

There is some sensitivity done there to the amount of thermal utilization that takes place. Down at the bottom, you have zero per cent thermal utilization and 50 per cent in the middle. As an example, if you look at the chart, if you have some diesel fuel costing $8 a million BTUs and you are displacing some commercial electricity at four cents a kilowatt-hour, you are going to be in a no-go situation as far as investment goes and you will not want to look at it much further, unless you can see some changes in those things. However, if you are in California and if you can get some gas for $4 a million BTUs and sell the electricity for seven cents, you will be in a very profitable project. I wanted to put that up to illustrate those relationships.

Mr. Snell: Excuse me. Can you explain "sensitivity" for me?

10 a.m.

Mr. Dixon: Sure. The first line assumes you are utilizing 100 per cent of the thermal energy that is available from the cogenerator as a base-load type of operation. The middle line represents an operation where you may be using the cogenerator seasonally and you are able to recover only 50 per cent of the heat, or there may be some other circumstances. That affects the economics.

You have to have an estimation right up front of how much heat you are going to be able to recover from a cogenerator in order to make a quick cut at the economics.

Are there any other questions on that?

Mr. Brandt: What would be the range for the cost of a kilowatt at the present time for cogenerators that are in place? Do you have a high-low range?

Mr. Dixon: I cannot answer that without knowing what the thermal recovery is for a specific cogenerator. You are speaking about the cost of the electricity produced.

Mr. Brandt: Yes.

Mr. Dixon: I cannot answer that without answering a lot of site-specific questions and knowing what fuel price we are dealing with, whether it is coal at $3 a million BTUs or gas at $5 or below it.

Mr. Brandt: There are those in place that are using a particular type of fuel now. They are obviously generating a cost per kilowatt.

Mr. Dixon: Yes.

Mr. Brandt: You mentioned that at some point there is a break point where it is a "no-go" project because the price is too high, depending on the fuel or the area. As an example, seven cents a kilowatt might sell in California, but it would not sell in Ontario because our price is considerably lower. We would have to look at those factors before putting this kind of unit in. Do you have even an averaging of a high-low range for what was placed? For example, is there anything below four cents?

Mr. Dixon: I do not know enough about the range to answer the question about the bottom end of the range. One statement from a manufacturer of small cogenerators in Massachusetts is that six cents is more or less a rule of thumb. That rule of thumb is a little dangerous because you have to look at the site-specific situation. You may be ruling out somebody who is sitting on his own gas well, sitting beside a sewage plant or something such as that.

Mr. Haggerty: In the comparison in that chart, what happens? I suppose you can take the word "cogeneration". You could have an industrial commercial complex using natural gas to generate steam that eventually may get into cogeneration to generate electricity. What benefits or losses are in the BTUs in this case where you use natural gas that can do the same thing? A number of things can do the same thing as you can with the residential use of either electricity or gas.

Mr. Dixon: You do not find very much residential cogeneration. Adding on to a plant that is already using natural gas or fuel to produce heat is a normal way to do cogeneration projects. You displace some of the fuel that normally has been used to produce the heat. You produce the heat with a cogenerator and produce electricity on top of that. Incrementally, the fuel used to produce the electricity is relatively low because you are already using some fuel to produce heat in the first place.

Mr. Haggerty: Yes, but that becomes a costly item, does it not, if

you compare it to the cost there? For example, if you take a natural form, say energy is natural gas, you can convert it into electricity. There does not seem to be a sensible approach to take to it. You can use gas to heat hot-water tanks in a home.

Mr. Dixon: I have an illustration. Again, it is a little further down.

Mr. Haggerty: Okay, I will wait. I am like my colleague; we will wait.

Mr. Dixon: We were asked to take a look at the potential benefits in terms of overall fossil fuel used.

Mr. Haggerty: I am just looking at the duplication. The end product is still electricity, but you are consuming other--

Mr. Dixon: The big driver is efficiency. It is a very efficient way to produce both heat and electricity, as I said. Maybe we should go to the next slides and I will run down the US experience to give an overview of what we found from our discussions with consultants and operators of cogenerating plants down there. Those are topics I am going to touch on.

This slide illustrates the number of small, cogenerating plants that have recently been applied for in the US. It also illustrates the ratio between the cogenerating plants and other small producers. You can see that the small power producers from biomass, and energy from waste, wind and such, are also advancing quite rapidly. In 1985, there were applications for 11,000 megawatts of small power projects. This is the dominant new power generating source in the United States.

Mr. Haggerty: Do those figures include any major projects?

Mr. Dixon: No, the average size of those projects is 18 megawatts. There are a lot of very small projects. To date, the total for planned and existing cogenerating and small projects is 42,000 megawatts in the United States. It is about two times the size of Ontario Hydro, all in units of 18 megawatts.

The main cause was the federal government legislation. The major thing done by the Public Utility Regulatory Policies Act was to create a fertile environment for cogeneration and, in a way, to set up some special rules to protect cogeneration and small power generation. Prior to that, there were a lot of institutional barriers, particularly set up by electric utilities that did not want cogeneration.

For cogenerators, PURPA provided the ability to parallel with the grid. From a design point of view, this did quite a few things. It lowered the first cost of plants and allowed the balancing of the thermal and electrical loads to be built into the design in a much improved manner. PURPA required payment of avoided costs to cogenerators and the setting-up of sales contracts for the power. This greatly enhanced the ability to get project financing. These few items are the things that caused the significant growth in the last few years.

Mr. McGuigan: Could some of them have avoided costs?

Mr. Dixon: Avoided cost? Actually, if we put the next slide up, that is still the major problem. How do you decide what the avoided cost is? When

you have a wide variety of circumstances in individual utilities, there could be excess capacity, people who are considering building capacity, people who are reformulating their planning mechanisms and their planning methods, and utilities that do not necessarily have all their ducts lined up in a row and know what the costs are going to be. The problem of determining avoided cost is still one of the major issues in the United States. There is a lot of debate over that.

The other problem is very interesting and there may be some lessons to be learned from it. Right now, California has 15,000 megawatts of cogeneration in small generation contracted for because it offered standard offers to qualifying facilities with quite high estimated avoided costs. This single thing produced some very profitable projects and almost a gold rush of people rushing in there to take advantage of the situation.

10:10 a.m.

In the initial estimates from the California Energy Commission, they were going to get 2,000 megawatts of cogeneration by the end of the century. They already are looking at 15,000 megawatts. The standard offers have been withdrawn. Some of the California utilities are now looking at an obligation to take base-load generation from cogenerators as potentially giving diseconomies to the ratepayers because they are not able to take advantage of some other opportunities for hydraulic power and the like that are offered from time to time. There is a note of caution in how one goes about introducing the rate at which cogeneration comes along.

Mr. Snell: What was it in the offers that made the diseconomies come about?

Mr. Dixon: The diseconomies are not for cogenerators. The offers were good offers, in general having a levelized capacity credit in there for a long term. Based on fuel costs, it simply produced a very good, profitable, cogeneration project for entrepreneurs and individual investors. The diseconomies that are foreseen are in the operation of the electrical utility grid in total, potentially driving out some of the other opportunities for lower-cost power that were not foreseen earlier on.

Mr. Snell: What you are saying is that within a utility there is an optimal limit of cogeneration within its mix.

Mr. Dixon: That probably is true for a particular utility and there probably is an optimal rate at which cogeneration or small power generation should be admitted so that utility operation itself can be used to the optimum. Some solutions to those problems now are being proposed in California and they mainly have to do with making more of the cogeneration capacity dispatchable or operated by the utility and changing the contracts thereby, looking at time of use rates and that type of thing which will permit cogenerators to shut down at certain times and make more money at other times, balancing off and adjusting the contracts. Those problems are being solved, but I just put that up as a warning signal.

Mr. McGuigan: What if you had a Niagara standing by that you had not used?

Mr. Dixon: We would want to find a way to use it.

Mr. McGuigan: This would prevent you from using it because you go back here.

Mr. Dixon: It is the contract for base-load power that prevents those types of things. It is the same question that arises whenever you are adding base-load power to a utility grid; you are pretty well obligated to use it. However, cogeneration does have some operating flexibility that has not been taken advantage of yet, which is cogenerators are able to turn off and use power from the grid and are able to use their previous heat source. There is some flexibility that is not yet fully taken advantage of in cogeneration. The other continuing United States problem is that many utilities continue to view cogeneration as a competititor to their main line of business and they just simply do not like it.

I guess Mr. Brandt has left, but this answers his question. This has to do with the in search of excellence thing and it has to do with real people operating real cogenerators--ones that are successful and working. The three main things that are common among all the profit-making cogenerators are that somebody has taken a lot of trouble to design that cogenerator, fit it to an application and has done a good energy study, especially on the thermal side.

Mr. Haggerty: The economics have to be favourable.

Mr. Dixon: The economics have to be favourable and they also have to be favourable in changed circumstances. You really want to try to look at some sensitivity in the design of these things. They are not just a single chunk of power and heat. You want to make sure it fits the plant, that the right equipment is chosen and that the best operating experience has been applied.

The second item is tender loving care--that is what I have titled it. Usually beside a cogenerator, there is some interested individual who looks after that cogenerator and looks after the operation. Having an uninterested party look after a cogenerator tends to lead to problems.

The other item that is pretty common among all the successful cogenerators is special circumstance. You may be looking at some cheap fuel, a very low installed cost or, as in the case of California, some long-term power sales contracts.

Mr. Haggerty: Are you aware of any industries in Ontario that are in cogeneration? Let us take the oil refiners such as Petro-Canada and Petrosar Ltd.

Mr. Dixon: That is a very common place to put cogenerators, even at today's prices. There are about 500 megawatts of cogeneration operating in Ontario. One that I visited was a Texaco Canada Inc. plant in Nanticoke. It is simply a steam turbine that uses the waste gas from the refinery as fuel for the boiler. The boiler spins the turbine and it produces electricity.

Mr. Haggerty: That is the only one you can recall though. Are there other ones?

Mr. Dixon: There are quite a number of other cogenerators. Dow Chemical Canada Inc. in Sarnia is quite a big one. They have gas turbines there; in general, though, you are looking at some special economic circumstance for the good ones.

Let me also talk about failure factors. There are many factors that cause cogeneration plants to fail, but they normally fall into three major categories. The first one is the failure to anticipate future developments, things that might change. Many of them are built and operated as if nothing is going to change.

Again, it gets back to my point about a sensitivity study around a cogenerator in the first place. People may build a plant based on wood chips when they think that wood chips cost nothing, then a couple of years later find a use for the wood chips that are worth $3 per million BTUs, which may make the plant uneconomic.

Another major factor is flawed design. There is not a lot of experience in design and application as yet. It is still quite an infant industry and cogenerators fail simply because the wrong equipment has been chosen or it is too big or too small.

The other factor is improper operation and this gets back to the tender loving care. It is the opposite of that. People tend to neglect maintenance. They neglect water treatment or neglect to change the oil, things like that. These are the common failure factors.

A secondary result of the PURPA and the rapid growth rate in cogeneration is technical developments and innovations. We are seeing now quite a few advances in factory-built packages for very small cogenerators of under one megawatt, from 500 kilowatts down to 15 kilowatts, and modularization of the equipment so that it is much easier to apply in modules.

This type of technology is aimed at a different type of market from where we have seen cogeneration predominate in the past. It is aimed at the commercial market, small buildings, hospitals and institutions. These packages tend to be higher in efficiency as the technology improves. Originally, 75 per cent is what you might have looked for. You now are getting 85 or 90 per cent overall efficiency of heating, cooling and electricity from the same 100 per cent of fuel.

10:20 a.m.

Also, through mass production in economies, you are seeing some standard sizes and lower first costs. Another significant advance is microprocessors being adapted to control cogenerators and to monitor them from remote sites. I have seen many sites controlled from a central point. They call up the operator when anything goes wrong. A little beeper goes on his belt. These are some advances now available to solve some of the problems of operating small-size cogenerators.

The other thing that has developed in the last few years is the emergence of third-party specialists, people who build, own and operate cogeneration plants of a wide variety of sizes whose main business is cogeneration. It is not a sideline.

Just to sum up the US conclusions and some of the lessons we might learn from the US, the start of it all was a government policy and a government interest in developing small power and cogeneration. It likely would not have started if it was simply a utility policy.

Mr. Moore: I would like to take you up on that.

Mr. Dixon: Sure.

Mr. Moore: PURPA is federal legislation but, as you have just said, cogeneration has only really taken off in California. Is that because the government policy triggered it and the utility policy allowed it to happen? Is that what that refers to? PURPA did not work over the entire United States.

Mr. Dixon: No, it did not work throughout the United States. It worked not only in California, but also in Texas and the south in general. The economic circumstances have to be there, particularly the fuel cost and the electricity price. In places with a lot of hydraulic capacity, for example, it is not very likely that there would be very much cogeneration in any case.

Also, it is up to the state level to regulate the utilities, so various states have either adopted PURPA and introduced those measures or fought PURPA. The state of Mississippi got into a big fight over it. There are quite a wide variety of responses to PURPA. The point I am making is that the start of it all was the federal government policy trying to make the environment better.

Mr. Moore: Would you agree that you need federal, state and utility co-operation to make it work?

Mr. Dixon: All three have to be there, no question.

Some utilities are now counting on cogeneration and introducing it into their plans. The more cogeneration there is the more it gives us a sense of confidence that it is a reliable energy source. When you have a few cogenerators, you are not too sure whether you can count on it. The more it is there the more it tends to produce confidence as a reliable energy source. The future for cogeneration likely will depend very much on utilities and whether utilities count on it as a means of adding small increments to their capacity when required.

We will go back to the two slides we took out earlier, then Gord is going to talk about project demands. We were asked to suggest what benefits might come to Ontario if there was some cogeneration. This is a back-of-the-envelope study to take a look at what the impact might be and answer some of the questions on overall efficiency.

I took the figures from the Ministry of Energy's base outlook in the year 2000 for commercial and industrial fossil fuel use and electric generation fossil fuel use, totalling 845 petajoules in the year 2000. I took a 10 per cent penetration of cogeneration into that commercial and industrial fossil fuel use market; in other words, I presumed we could generate the same thermal requirement with some 10 per cent cogeneration instead of via boilers or whatever else is being used.

The second column, 10 per cent cogeneration, shows the effect of that. A six per cent increase in the commercial and industrial fossil fuel use has quite a bit of leverage when it goes to reducing the fuel use for electric generation, a 45 per cent decline. The net difference coming from the efficiency of cogeneration is a reduction of 71 petajoules in that Ministry of Energy year 2000 scenario. A petajoule is 33,300 tonnes of coal. You would have to tell me what it is going to be worth in the year 2000, but today that is $2 million worth of coal.

If you go to the next slide, the result of that scenario--and I am not suggesting that is a target of any sort; I want to illustrate the overall energy effect--is a reduction in fossil fuel in those sectors to produce the same energy services. If you are reducing coal, even if you are generating the cogeneration with coal, you are going to have a reduction in acid gas emissions and that may have some benefit that is worth looking at. That amount of penetration likely could be accomplished by 900 megawatts of cogeneration which, in turn, would displace 900 megawatts of requirement for new generation.

I put a question mark beside scrubbers because I do not know what the expenditure is going to be on them. Scrubbers are devices to improve the acid gas emissions from coal-generating plants. Alternatively, there is a benefit that could be looked at there. I wanted to outline some of the potential benefits you could be looking at.

Now I will turn it over to Mr. Graham.

Mr. Graham: I am Gordon Graham of Blake, Cassels and Graydon. There may be an element of coals to Newcastle in my discussion. I have as an object breadth more than depth, but if there are any questions later, we can get into some depth.

I am going to focus on the third-party operators Frank Dixon mentioned a moment ago. Needless to say, if existing private sector players are interested in cogeneration and are going to finance it in the context of general corporate borrowing, then general banking and credit criteria apply.

The privatization issue very clearly gives rise to the question of whether a good deal of the take-up of this business opportunity and this technology would be by new players with specific investments in cogeneration capacity, as Frank mentioned, at a host site. I recognize that some of the cogeneration may stand alone, but Frank tells me that primarily the market opportunities are for cogeneration in conjunction with existing industry and existing plants that have a use for the heat.

A couple of background observations are somewhat subjective but come of direct experience and may be useful. The issue of privatization is an attitude as much as anything and it is well advanced in this country at the moment. For example, as I understand it, at the federal level a good many of the Nielsen committee task force recommendations were taken up long before the reports were tabled. In that context, I should note the attitude of the capital markets in general.

I will not examine or dissect the capital markets and the different attitudes of different players, risk aversion and that kind of thing, but definitely there is a different attitude among insurance companies, pension funds, etc., in investment decisions and lending decisions than there is at the other end of the scale with the banks and the venture capitalists.

10:30 a.m.

The public policy attitude towards privatization, in my view, has an impact on the attitude of lenders. That is important in the 1980s, because lenders are tending to look for fee for services much more than they did heretofore. In the 1970s, the lenders were remunerated in their spreads on loans. Sophisticated computers and internationalization of the capital markets meant that spreads were much reduced and thinned out. We now have capital markets which focus very much on separating investment banking and merchant banking from the old, conventional, garden variety of commercial banking.

The attitude of the capital markets to privatization of an activity such as cogeneration is very important in terms of the willingness of lenders to learn enough about this technology and about the opportunity to develop the capacity to make the loans on a project-financing basis or any other basis. The key there is that banks in particular which, in a startup or an infant industry cycle, are going to be the lenders of first resort for sponsors of cogeneration, are becoming much more entrepreneurial. They are looking for

opportunities to stretch out the powers and the scope of acitivity of banks--to take equity, to take risk, to be remunerated for risk--rather than making loans on a money-over-money basis.

In that context the discussion of privatization of the cogeneration activity turns to project finance. In a sense, project finance from a banking standpoint is quite simple compared to general corporate lending. In general corporate lending the banks have to accommodate a great number of risks that face the borrower. The borrower in a general corporate loan has to manage all kinds of risks: product development, market surveys, managing labour, managing production, financing sales, collecting receivables, etc. In project financing the issue that faces the lender is much more a simple economics analysis of the marginal cost, the economic effectiveness of the particular cogeneration plant as a separate economic unit.

If the economics of cogeneration are affected by artificial factors, such as purchase rates under PURPA or under any other kind of policy, if the cost of fuel is artificial because of supply contracts, if the sale of the energy is artificial in economic terms because of take-or-pay contracts, the lenders will be considerably more cautious than if the price levels are more determined on a fairly objective basis by market than by policy.

Some of the comments Frank made directed themselves to establishing a policy environment in which the market forces can operate. Cogeneration is efficient. If it is sufficiently efficient that the market would set prices for the energy and that utilities would co-operate in terms of purchasing at those prices, then the bankers will view the projects as supportable and bankable.

Financing is very much an issue of the identity of the parties involved. Bankers are reputed to want equity from the sponsors of a project as a discipline on the sponsors and as a margin for risk. In project financing that factor is much overplayed, much exaggerated. In the 1980s, the banks are not looking at artificial factors, such as distorted pricing in contracts. They are looking at the basic economics. They are not looking either at the cushion for risk in the sponsor's equity contribution. They will be looking for management and for a fairly sophisticated project sponsor but not for the investment. That will be a question of the economics of the project.

In looking at the marginal economics of a cogeneration plant, it is somewhat different from conventional project financing. You could take the economics as a microeconomics question, that is, the competitiveness of a particular plant in a local area or in world markets. In cogeneration, and I defer to Frank and others on this, the ability to transmit the electricity puts a geographic boundary on the area within which the pricing and the efficiency of the plant can be valued.

The technology Frank has described is not an issue for the lenders. In project financing they would take the technology as a given. To some extent, there would be reliance on consultants and on sponsors to certify the technology, so to speak, but lenders in general will not get too much involved in whether the mine, the petrochemical plant or whatever works. That is taken as a given.

The permanent project financing generally is not committed until completion of the project. The factors Frank mentioned in terms of failure tend to be factors that occurred in the operating period as opposed to the startup period, although the question of scale and site-specific design very

much relate to the turnkey aspect of the financing and to whether the permanent financing will be committed.

Take-or-pay contracts are somewhat suspect now by lenders. Events have occurred in recent years in which take-or-pay contracts have been effectively repudiated. Public policy has changed over time. Deregulation in the US is an example. The reliance on take-or-pay contracts is very much affected by general public policy. The failure of banks in Canada has in quite real terms affected the attitude of the private sector in relying on comfort letters and stated policy rather than in looking at specific legal obligations and the administered policy.

The supply contracts are the other side of the project economics analysis and in this context do not present any great difficulty, but lenders tend not to be impressed with supply contracts that do not seem to be realistic in terms of market prices.

The most significant questions, in my view, as to whether privatization of the cogeneration activity is likely to be supported by the lenders of first resort in terms of project finance, relate not so much to what I have covered in a superficial way, the mechanics of project finance, but more to the structure of the capital markets and the legal infrastructure or the policy infrastructure in which the activity may occur.

10:40 a.m.

The general attitude of public sector and private sector to privatization is a factor. The makeup of the capital markets is a factor. Securities regulation is a factor. Tax considerations are very relevant. In Canada, very recently, in the latest budget one major technique of tax-supported financing, the use of limited partnerships with limited recourse obligations of the limited partners for the borrowed capital in a project, was effectively stopped. At the moment in Canada it is fair to say that the type of financing that would be involved in cogeneration would not be tax supported.

This raises an important point in comparing the experience in the United States with the experience in Canada on the willingness of investors and of lenders to participate, with or without the Public Utility Regulatory Policies Act. In the United States the tax regime was quite different from what we now have in Canada. A good example of that is the leverage lease financing technique, in which the taxpayer who is taxable invests in a $100-million cogeneration plant but puts up only $20 million of his own money. By borrowing the other $80 million on a nonrecourse basis--meaning that the banker takes the repayment out of the project revenues--for an investment of $20 million, effectively the taxpayer gets tax write-offs based on $100 million. The simple arithmetic of it is that in the first year the investment is completely repaid or is so attractive that the tax regime is reason enough to invest in this kind of activity. Frank mentioned the California experience in passing. In California to some extent pricing under PURPA has created that situation in which decisions to invest were based on something other than basic economics in some cases.

The general infrastructure in which the cogeneration would be reviewed by banks would include some mechanical, legal and banking points, which I will not labour here. I will just give you a flavour of the representative issues. If you have a host industry, a plant that decides to introduce cogeneration, in effect you have an opportunity to reduce the overall energy costs of that industry. However, the addition of the cogeneration plant within the industry

operations may be difficult to isolate. It may be difficult to take a mortgage on a plant that is located in the middle of a larger industrial plant, and it may be difficult to isolate the cash flow from the cogeneration activity.

Thus, some of the basic techniques that lenders use to enable them to take the project itself as the primary source of repayment of the debt are not available or are difficult to accomplish. If the cycle for a particular industry is negative in the bank's view, then regardless of the economics of the cogeneration plant itself it may not make any sense to finance the plant, which will be located perhaps in a larger context with a very short investment time horizon.

The larger plant may be shut down in five years, and the cogeneration financing may be based on a 12- or 13-year term. Of course, in that context the banks have to look not only at mundane legal questions, such as how you take a mortgage on a piece of one link in the chain, but also at questions such as whether the economics of the larger plant, the larger industry, are more relevant than the economics of cogeneration itself.

The banks refer to that kind of problem as the stand-alone concept, isolating an aspect of a project from the overall activities and assets of the corporation. It is the kind of difficulty that would have to be addressed by the banks at some expense. Resolving that kind of question involves a great deal of time--professional time and bankers' time--and co-operation from the plant, and it raises significant barriers to project financing, such as the scale and the transaction costs.

Those and other problems mean that cogeneration financing through project finance probably is going to be a function of whether the activity is so large that the banks see a major lending opportunity. They will have to go through a learning curve, establish capacity to handle the types of negotiations involved and perhaps establish new security instruments, etc.

Dr. Levy: That is the presentation.

Mr. Haggerty: I want to ask a question about the gas industry in Ontario. I suppose Ontario Hydro is your competitor in the sense that you are competing in the same market to get the same result, and that is to provide home heating to the general consumer. I thought perhaps we would get into this thing in more detail today, that we are providing almost the same thing as Consumers' Gas in competition with electricity.

For example, I have had different viewpoints expressed on advertisements in the local newspapers and other media communications indicating that if you buy a hot water tank, it is a lot more economical to go this way than it is to have Ontario Hydro install a hot water tank. Is there any duplication in this service with the end result that either one, electricity or gas, can be competitive enough so that the consumer is going to get full benefit out of it?

Mr. Dixon: Are you referring to cogeneration?

Mr. Haggerty: Cogeneration, I suppose, where you are using natural gas in a number of cases. The end product we are reviewing is the cost of electricity to the consumer of Ontario when there are other alternative energy resources that we should be looking at in order to say, "This is the way we should be going," whether it is electricity or natural gas.

Mr. Dixon: We are here as an energy services company. To do energy services properly you have to be pretty well unbiased, and we are. That is how we operate.

Mr. Haggerty: Have you done any studies in the area that I am questioning you on?

Mr. Dixon: A gas industry panel is due to come along at a later date, and that may be a more appropriate question for them.

Mr. Chairman: The Ontario Natural Gas Association is appearing before the committee. I was very tempted to rule the question out of order.

Mr. Haggerty: I thought it was a good question.

Mr. Dixon: Maybe I did that.

Mr. Chairman: You did that very well.

Mr. Dixon: The principal function of an energy services company is to go after efficiency, and that is what this company is all about. We pride ourselves in being good at getting efficiency, regardless of what fuel there is.

Mr. Haggerty: The chairman has ruled me out of this until a later date. I suppose I will have to let that question go. I will get the answer from somebody yet.

Mr. Dixon: It is probably a good question for ONGA.

Mr. Charlton: In your presentation you described essentially how PURPA set the stage. Some states and utilities took that opportunity and ran with it; others fought the opportunity. You have talked about what you see as some potential for cogeneration in Ontario. In your view, what is the situation in Ontario currently with respect to that question of attitudes towards cogeneration? In your experience, how does Hydro, for example, view cogeneration?

10:50 a.m.

Mr. Dixon: To make a judgement on it the way it is now, I would say it is neither hostile nor positive. It is more or less neutral as far as I can see. Hydro is doing quite a number of things to experiment with cogeneration and bring it along. It has recently increased the buy-back rate and taken some positive measures. I would not characterize Ontario Hydro as being hostile to cogeneration, as are many United States utilities, which tend to view it strictly as a competitor; they just do not want cogeneration. I do not think Ontario Hydro views it in that way.

Mr. Charlton: There are a number of questions that obviously come up in relation to cogeneration. You have just described for us some of the things that Hydro has recently done. In your view, are there things in Hydro's structure or in the way that Hydro approaches the whole question of supply and demand that put roadblocks in the way of expanded cogeneration in Ontario?

Mr. Dixon: One of the most significant things that could be done would be to look at the terms of contracts for buy-back, longer-term contracts for the financing.

The other thing that could be done is to do some work on streamlining or facilitating the process of getting an interconnection or a contract, particularly as applied to a small-sized cogenerator. When you look at the market studies, the bulk of cogeneration is in the industrial side, the large size, as you know, but a lot of potential is in the small size. The problem with a small-sized unit of 50 kilowatts or 500 kilowatts is that it is really not worth hiring all the Gordon Grahams or the people who are required to do an extensive negotiation when you look at a very small quantity of profit in any case.

A lesson from the United States that could be learned there would be to look at streamlining or facilitating the means of interconnecting for someone who is small and really cannot afford to go through a heavy negotiation because it is not a big project. I would say there is probably some work to be done there.

Mr. Charlton: In terms of utilizing the expertise in the utility itself?

Mr. Dixon: Yes.

Mr. Graham: If I may make a comment, it is not only a question of expertise; it is very much a question of attitude. For example, if the willingness of Hydro to go to a 10-year purchase contract is there but the standard form put on the table at the commencement of negotiations is five years, then on the small-scale packaged cogeneration, where it is not being handled professionally or whatever, it may be assumed that the five-year term is a limit, or a cap. That can be a barrier to even preliminary discussions with lenders. The thing does not get off the ground because of perceived problems. It is not just expertise; it is a matter of whether you grease the skids or not.

Mr. Charlton: You threw into the presentation a couple of examples of what happens if you do certain things. For instance, there was the example of the 10 per cent cogeneration as opposed to the Ministry of Energy estimates for the year 2000. I assume that was just an example and not an estimate of what was possible.

Mr. Dixon: Yes, that is right. I chose 10 per cent arbitrarily to illustrate the kind of efficiency in the use of fossil fuel. I suppose if you did do that 10 per cent and you got 900 megawatts of cogeneration in addition to the 500 we have now, we would have 1,400 megawatts of cogeneration, which would still represent probably five per cent of the generating capacity of Ontario. That probably is less than the technical potential for cogeneration. I think the Ministry of Energy has estimated that 5,000 megawatts, technically, could be attached. There are various estimates of that.

Mr. Charlton: On that question, we have seen some figures thrown around of what is technically possible. The real question boils down to what is cost-effective at this point, what is econonic. Do you have any estimates of projects that should be economic at this point that are not coming on stream that should be, in your view?

Mr. Dixon: We have not attempted to look at the economics in that depth or tried to estimate what the economic potential is; that is not the purpose of what we have done. I think you would have to look to others, or maybe do some work on trying to estimate what that is.

Mr. Charlton: Okay. Thank you.

Mr. Chairman: I wonder if I may ask a supplementary to one of Mr. Charlton's questions on the question of capacity credit. How generous can a utility be on a capacity credit when it has a surplus generating capacity?

Mr. Dixon: That is a very good question. It goes back to the problem of timing, which is common in those states that are looking at how to allocate a capacity credit.

Florida, for example, is looking at giving an up-front capacity credit of so many thousand dollars a kilowatt because of the situation there. What it really gets down to is the decision on what sort of capacity credit or what sort of credit to give a cogenerator. It may come after the decision on what the levels of capacity are that are going to be added, and they will run from a central point of view. You need a sense of that. It is difficult to say in an overcapacity situation without having that information there. That is one of the main problems.

In California the capacity credit was levellized over the contract. In some cases you get the capacity credit at the end of the contract when the capacity would have been needed, maybe 10 years from now. There are a lot of different ways of doing it.

Mr. McGuigan: To pick up on the capacity credit idea, looking at it from a public policy point of view, you make the argument that a customer is being charged the capacity credit for the reserve that Hydro has. If Hydro has a 25 per cent overcapacity to take care of emergencies, then the customer is paying for that capacity credit.

Mr. Dixon: That is in the rates right now.

Mr. McGuigan: If you give a capacity credit to a cogenerator, you would not be treating that cogenerator any differently than you would be treating Hydro itself from an overall public policy point of view.

Mr. Dixon: Yes. The only thing we are saying about capacity credit is that if you want a lot of cogeneration, there has to be some sense of what that is; there has to be some capacity credit given to the cogenerator.

Mr. McGuigan: I guess you would not want to bring on 50 per cent overcapacity.

Mr. Dixon: You may not want to do that, no. It is a question of inserting it into the plans at some point and deciding what increments need to be brought along.

11 a.m.

Mr. McGuigan: Getting down to small units, I do not know what "18" really stands for, but I am thinking of a widely dispersed company or a company not in a city that might have a source of energy but is limited by the power lines that go in front of the facility. It might be as low as 110 volts--it might be 220 or 550. What sort of limitations does that place on feeding power back into the system? For instance, it might be a power line that is simply servicing a couple of streets. Can you reverse that power and send it back the other way?

Mr. Dixon: Yes. That is generally what is done with parallel cogenerators. The amount of electricity that is exported back into the grid, of course, depends on the amount that is being used inside the plant too. For the most part, cogenerators are being sized to try pretty well to match the electricity use in the plant, with the exception of the so-called Public Utility Regulatory Policies Act plants, which are placed beside an industrial plant that can use some of the heat for the expressed purpose of producing a lot of electricity and exporting it into the grid. Those plants likely require some fairly special interconnection expense to be looked at.

Mr. McGuigan: I was thinking more about southern Ontario. The farmers there have small gas wells, and these would be really free-standing power operations. I have one myself. What limitation would be placed on my selling back this power?

Mr. Dixon: I think the main limitation in your situation is what you are going to do with the heat from a cogenerator or the like. You may be looking at strictly producing power from the gas with a generator and not having anything to do with the heat. It is hard to visualize what to do with it out in a field somewhere.

Mr. McGuigan: I would be until I got around to putting up a greenhouse or something to use the heat. What limitation is placed on putting it back into the system if there is only a 110-volt wire in front of my farm?

Mr. Dixon: What the problems are there is really not my area; so I cannot tell you. I suspect the limitations are not significant and that there are not major problems, but check with Hydro.

Mr. Brandt: Can you assist me in perhaps differentiating between the kind of legislation we would require here in Ontario to encourage cogeneration and the United States experience with PURPA? What are the key things we would have to put in place?

Mr. Dixon: I would say we do not need PURPA. What we do in Ontario probably should be unique and it should be designed by Ontario, based on our unique circumstances with Ontario Hydro and our history.

I think there are probably some elements of PURPA we should take a look at and accept or discard, but I really cannot say what in particular is required for Ontario. What I can say is that I think we should design it. We should have people coming from California here to see how to do it as opposed to the other way around. I really do not have a particular set of policies and things to recommend right now, other than our general statement that likely some government involvement in setting those policies with Hydro is required.

Mr. Brandt: You are suggesting, however, I believe from the answer you have just given, that we do require some kind of a road map, legislative or otherwise, to get from point A to point B to encourage the establishment of cogenerators, if that is the direction in which we propose to go?

Mr. Dixon: Yes. If we want cogenerators, we are going to have to create some of those environments I described earlier. We do not have any specific recommendations on how to do that right here.

Dr. Levy: We did have some thoughts after looking at the United States in terms of the rate at which you do things, how it is done, the mechanics, plus your expertise. There are some things which Frank observed in his visits to the United States about the rate at which you do things.

Generally, the issue, as we understand it, is all tied up with the planning process of energy for Ontario--not electricity, but energy. What is at issue here is the framework on which Ontario Hydro is going to do its planning. That is what we are looking for before we make investments. However it is done, the small work that is going to be private sector is going to have to coexist and live with Ontario Hydro in a win-win situation, in a comfortable situation. The environment has to be right.

Mr. Brandt: Do you have any discomfort with the fact that Consumers' Gas, which is 50 per cent of your company, is de facto a competitor of Ontario Hydro's? You are in the same market. Are there any possibilities of conflict there?

Dr. Levy: I would say that if you look again, we are saying, "Do not do what has happened in the US, but look at the US." If you look at what has happened in the US, the energy service business is a growth business. For example, I saw in one of the reports, which I think was out of Hydro--and you folks looked at it and I think Art Rosenfeld touched on this yesterday--there was a statement made that any energy efficiency investment in which there was a payback of two years or less naturally would be done out there. There was no need for a third party.

I think that is not true. My company survives and lives off looking for those opportunities and assuming the technical risk. I think utilities in the United States are looking at more than providing electricity. What we really do is a mission statement for our utilities to provide energy services. Utilities in the United States have spawned companies and they have got interested in companies such as ours.

I think what Consumers' Gas has done--and Consumers' Gas can speak to this--is that it saw an opportunity to invest in energy efficiency. It is good business and it makes sense. You need a certain combination of the players you see perhaps before you--financing, legal, technical--to put it together in one organization and over a short space of time to invest, get your money out of your performance and the productions you have had. I do not see a conflict.

Rose Technology Group Ltd., and I should say this for Mr. Haggerty as well, is in the business of making energy efficiency approvals for its customers. We will convert them back to electricity, if it makes sense economically to our customers, if they are on gas. It is very important that there be no conflict; otherwise, we cannot operate. We would have no credibility in the marketplace if there was any type of a conflict, and there is not any.

Mr. Brandt: I was trying to get a somewhat clearer picture, recognizing that the US primarily has privately operated utilities as opposed to the public utility here in Ontario, and what the complications might be in applying the American experience to Ontario. Obviously, you cannot import American ideas in total and have them work effectively in Ontario in all circumstances. I can think of a number of situations, not necessarily in the energy field, where on occasion we have tried to import an American idea and it has not worked quite as effectively here as it did there because of an entirely different business climate, the environment and the sheer size and magnitude of the market they are serving there. That is a factor in many respects.

That is why I wanted to search out your response to whether the Public Utility Regulatory Policies Act should be picked up entirely and superimposed here or whether you had to find some way of modifying, embellishing or changing PURPA for purposes of applying it in Ontario and making it work here. That was the thrust of my earlier questions.

11:10 a.m.

Mr. Graham: If I may make a comment to that, and I think that is very true, I was alluding to that in terms of the tax context. Sometimes it is possible to look at US experience and think that something was driven by an entrepreneurial instinct or PURPA or something else, but if you were aware of safe harbour leasing rules or accelerated cost recovery depreciation systems or energy tax credits and investment tax credits, and if you add all those up, it may have been the accountants and the lawyers who were driving.

In response to your question specifically, one thing to note is that by diversifying the suppliers, if you like, through cogeneration and private sector cogeneration, you are not simply distributing risk in the sense that insurers do that with out automobile liability coverage; you are creating the opportunity that players who have a different perception of the risk will participate. One of the big differences between Canada and the United States is risk aversion, the willingness to invest, that kind of thing. The old saw about Canadian venture capitalists being more vulture capitalists than venture capitalists is a function of psychology.

By introducing to the cogeneration or the energy supply picture another party that specializes, as Alan said, in recognizing opportunities and then dealing with the barriers to the takeup of the technology to the investment opportunity, dealing with those differently, because it is the main line business, and being willing to manage risk as opposed simply to distribute it, you now have a different perspective in the overall energy supply piece.

The comparisons between the United States and Ontario are very dangerous in many ways. I suppose the introduction of this activity to Ontario, if it is not privatized, so to speak, is a function of one perspective from one point of view and one policy mandate. Diversification would change that.

Mr. Chairman: Mr. Haggerty has a brief supplementary.

Mr. Haggerty: I want to follow up on what my colleague Andy has been trying to get at here. We talk about privatization of the American side compared to the Canadian side. When you talk about investments, take the investments now in the electricity facilities in the US and the difficulties they have had with a number of nuclear plants, and they have a number of them. Apparently, they have almost cancelled or stopped any further construction on them because of the lack of investment from the private sector.

Here there could be--no doubt about it--some benefits to the Canadian operations in cogeneration. One the panellist mentioned Dow Chemical. I suppose if they can the surplus of material goods--energy, the BTUs that are coming into that plant or from Petro-Canada, one of the two--it is a benefit to them to go to cogeneration. Of course, the spinoff is a benefit to Ontario Hydro too because they are not demanding more input from Ontario Hydro.

The cutback in the construction of nuclear or hydro-generating stations in the United States and going to cogeneration is through the private sector. I suppose they are looking to Canada in the north which has good, vast

resources of renewable resources such as hydraulic generating stations. We have hydraulic plants from British Columbia to New Brunswick gearing up with public tax dollars so they do not have to go to the private sector to get it. They can always go to the well as many times as they want; it is the taxpayers who are paying for it through a government project. I suggest they are gearing up for export to the United States, all or the majority of it.

Mr. Chairman: Coming to the question?

Mr. Haggerty: The question is, maybe the timetable in the United States is waiting to say: "Cogeneration is going to get us over the present crisis, but we can get this cheap energy from Canada and all the provinces. Why build and construct new generating plants on the American side, either fossil fuel or nuclear?" One of the faults I find with this is the money borrowed to construct these plants in Canada is American money.

Can somebody on the panel here can tell us if this a viable situation that Canadian utilities should be into, paying expensive money from the United States with the exchange on the American dollar? Is it profitable for Canadians, or are we as a customer of Ontario Hydro--

Mr. Chairman: Mr. Haggerty, may I interrupt? We have two more witnesses before lunch. If you have a question, please put the question.

Mr. Haggerty: The question is, is it the way we should be going? In your studies have you come up with come up with--

Mr. Dixon: Yes and no.

Mrs. Grier: Can you comment on the question of reliability? This is always a concern of Hydro and brought up as, "You cannot really put too much emphasis on cogeneration because reliability of supply is essential."

Mr. Dixon: Yes. The cogenerators in some places such as Massachusetts, I believe, are being credited with more reliability, adding reliability to the system. The reason is that a turbine, a gas engine or something that is a well-known technology like that is pretty easy to fix. The operating statistics of these base-loaded plants are very good.

We have reciprocating engines that operate for 90 to 95 per cent of the time, which is better than a nuclear plant. We have gas turbines that run at 97 per cent of the time. They can be fixed very easily when they break. You just take one part away, put in another module and it is back on line again. They are in the capacity credit that they get. They are being assessed an incremental value for reliability. There is also a reliability component in having a large number of distributed small units as opposed to one large unit.

On the negative side of reliability--and this is an issue to be considered--is that cogenerators tend to be economic only if they are located beside a plant that needs the heat that is in business. If that plant is going to be out of business 10 years from now, it is not going to be ready to supply the electricity.

Mr. Snell: If their needs increase, they just cut back on what they sell to the grid. I guess I am concerned, along with Mrs. Grier, about the type of contract you get into. If their needs or their economics change in their other business, how reliable is that source? Can you rely on it as part of your system?

Mr. Dixon: As long as they are in business and they need heat, you would have an increment of electricity there that is available. Whether they are using it or somebody else is using it, it does not matter. I guess the difference between a major utility-owned nuclear plant or a coal plant is you can pretty well rely on that being there and producing electricity for 30 or 40 years or whatever. You do not have that same sense of reliability on a small plant that is attached to an industrial plant because you really do not know if the industry is going to be in business or not; so there is a factor there that discounts the reliability. There are pluses and minuses to the reliability, but in general there is some reliability improvement from having a large number of small increments.

Mrs. Grier: The reliability comes from the mixed portfolio.

Mr. Dixon: Yes, it balances out the portfolio.

Mrs. Grier: Thank you.

Mr. Snell: It seems to me there are two types of cogeneration. There is the kind that is like conservation; it reduces the electricity needs of a manufacturing operation because it is better at recovering the waste heat from its operation. There is another kind, which is a cogenerator that sells back to the grid. It might be the same thing in some cases, and this is where the reliability comes in. If they have less waste heat or this surplus electricity to sell back to us, how much are they going to have of that to sell back to us and how much control do we have over that? I can see that as a legitimate concern from the utility's point of view.

What I am trying to understand is, how much does the selling part back to the grid part, the buy-back rate, make the economics of the conservation side go? In other words, there is a very large capital investment in a lot of these cogeneration plants, and we can all agree pretty well universally that the conservation side, waste heat recovery, is very valuable to society. There is a question about the other and how much we want to rely on that. In the first part, how much does the conservation side of cogeneration rely on having to sell the surplus electricity to the grid, i.e., the buy-back rate to finance little projects?

11:20 a.m.

Mr. Dixon: In many cases, it does not. We have 500 megawatts of cogeneration now and the main reason for having it is there are economics in that situation. Your question is really how much more cogeneration you get when you increase the buy-back rate, and what is the purpose of increasing the buy-back rate.

The purpose of increasing it is to induce more cogeneration to get more capacity in the system, and you would only get more capacity for a particular price. There are two kinds of cogeneration in that way. There is the cogeneration that you purposely bring along, and there is the cogeneration that is going to happen for efficiency reasons in any case.

Mr. Snell: The other side of my question is if there is a lot of potential out there for cogeneration to be used internally, and that potential is not being realized, why is it not being realized?

Mr. Dixon: For the reason I showed on the chart. You are below the line as an investment in cogeneration. The relationship between the

electricity and the fuel price is not there, for the dollars it would cost to put it in. That is the reason.

Mr. Chairman: Thank you very much, gentlemen.

The schedule for today does not show Mr. Argue from Passmore Associates International, but we will hear from Mr. Argue as soon as we have finished with Mr. Dupuis's testimony.

Mr. Mike Dupuis is the owner of Galetta Power Ltd.

MIKE DUPUIS

Mr. Dupuis: Mr. Chairman, I would like to thank you for having me to speak to the committee. I have prepared a short speech. It may take a while to read. That is actually the contract for the purchase of the Galetta generating station.

Mr. Chairman: Do you propose to read it all or to give us the highlights?

Mr. Dupuis: It is just an outline of what our company is, what it has done in the past and our experiences with the Galetta generating station. The station is located on the Mississippi River, 60 kilometres west of Ottawa. It was built in 1907 by local businessmen to supply electricity to the towns and villages in the area.

In 1929, Ontario Hydro purchased the station and operated it until June 1981. Over many years, the plant had deteriorated to the point that it was no longer safe to operate, and it was decided that the necessary repairs would be too expensive. A tender to sell the station was sent out in November 1982, and upon closing, had attracted 22 proposals, including our own.

After studying the proposals for two weeks, the list was shortened to five and meetings were arranged with each of the eligible companies. Of these five companies, four were asking for large subsidies from Ontario Hydro before they would accept the station. Our offer was that we would pay $50,000 and make all of the repairs at our own expense.

Because our company was very small, with limited financial resources, Hydro doubted we could make the project a success. For this reason, it decided that we would sign personal guarantees for an additional $125,000 in the event we failed and Ontario Hydro was forced to take back the station.

In April 1983, Hydro announced it had accepted our offer and so began the lengthy process to negotiate the purchase contract, as I showed you. On July 29, 1983, the papers were signed and construction began. The following work was carried out. We built a coffer dam and dewatered the tailrace; we poured 60 cubic yards of concrete to stabilize the foundation; blasted and excavated the tailrace to deepen it two metres; rebuilt the 12 turbine gate assemblies; and recalibrated and tested all electrical systems.

On January 29, 1984, the station was inspected and allowed to be put on line. The output of the plant had been raised 800 to 1,100 kilowatts, a 37 per cent increase. Production for the last two years has averaged 6.2 gigawatt hours, a 32 per cent increase. This increase is due in part to the many improvements made during the rehabilitation of the station. Another factor contributing to the greater output is that we have been able to manage the

operation of the plant more efficiently than Hydro was able to.

A microcomputer has been installed, which monitors the station and alerts an operator in the event of an alarm condition, for example, worn bearings, loss of power or low head pond level, etc. In addition, the computer can be called from any remote terminal, and the present status of up to 64 channels can be transmitted via telephone line.

The complete Galetta project was carried out using our own money except for a $10,000 business improvement loan to purchase the use of construction equipment. The equivalent of $250,000 worth of machining and mechanical work was done in our own shop and $300,000 was saved by doing our own construction work. The entire project took six months. It was done with an average of four men working 10 to 14 hours a day, six days a week. Approximately $2,500 was paid to outside expertise in the civil and electrical areas.

All profits to date have been put back into the company to purchase equipment, in order to upgrade our construction and machine shop facilities. In addition, we have purchased four Hydro power sites on the Bonnechere River. It is our plan to install a total of five megawatts of capacity over the next five years. These sites are located between the towns of Eganville and Renfrew, which also have small hydro developments. The public utilities commissions in these towns have been notified of our intentions and have expressed an interest in possibly upgrading their facilities and tying all the plants together with a computer. This would allow the plants to be operated in such a manner that at certain times of the day the demand of the towns could be reduced significantly by passing more water and then storing water during off-peak times.

It is our estimate that the potential on the river is about 14 megawatts, which now has an installed capacity of 2.3. Such an operation would be a great advantage to the towns, as well as to Ontario Hydro. We have also been negotiating for sites on the Mississippi River that lend themselves to being developed in a similar fashion.

From this information, you would think that small hydro is a great business to be in, with unlimited possibilities. From our point of view, it is, but you must understand that unless one possesses the skills and resources that our company has, he will find small hydro a very frustrating business for the following reasons.

In the business you need know-how. You must have acquired this from experience, or you must pay for it. Lending institutions have little knowledge of small hydro and do not seem to be interested in taking the time to learn. Institutions that are willing to lend venture capital look at small hydro as high risk and are looking for a 20 to 30 per cent return on investment.

The equipment manufacturers have priced their turbines to be competitive on the United States market. With the strong US dollar and the higher energy rates, these expensive turbines are being installed at a very impressive rate, but are far too expensive for the Canadian market.

After dealing with Ontario Hydro for three years, it is hard to tell whether small hydro is welcomed or only tolerated. If small hydro is going to go anywhere in this province, our utility must decide whether there is a place for us in its organization.

In New York State, Niagara Mohawk has decided that small hydro is of

benefit to the utility. Some projects that were considered to be marginal at 6.5 cents per kilowatt hour have gone ahead because the utility agreed to pay 8.5 cents for the first 15 years with the extra two cents being paid back in the next 15-year period. This utility has also developed some small hydro sites as a joint venture with private companies. At the present rate of 3.45 cents, there will continue to be development of small hydro in this province, but it will be at a snail's pace.

Ontario Hydro's pay-back is moving toward their average cost of production. Hydro has said that their responsibility to the people of this province is to provide power at cost, and it is not fair to pay private producers more than this average.

At first glance, this sounds like a fair statement, but as Hydro's surplus capacity is depleted, it must build new plants and will inevitably raise the average cost to the consumer at an accelerated rate. If private enterprise can install some of this capacity, it should be encouraged to do so. If the buy-back rate were increased to five cents or more, there would be a small boom in the industry. The small increase in rates would be quickly offset by the thousands of jobs created in the construction and manufacturing sectors.

11:30 a.m.

Ontario Hydro's plan to phase out its coal-fired plants will place a greater dependence on nuclear power. Nuclear power provides a centralized base load that lacks the flexibility of hydro power. If there were hundreds of small stations throughout the province, it would reduce some of the need for large transmission lines and millions of dollars would be saved annually on transmission losses. Having a handful of nuclear stations providing the province's electricity is like putting all your eggs in one basket. It is unlikely that under the worst conditions more than five per cent of the province's water power would be out of commission, but if two or more of Hydro's nuclear plants were down for maintenance the system might be heavily burdened.

Ontario Hydro should examine all of their small hydro stations to see whether any are being operated on a marginal basis; some of these could be sold or leased to private companies that could probably operate them more efficiently and cheaper for obvious reasons.

In the light of Ontario Hydro's expertise in hydro, they are in an excellent position to evaluate the viability of a hydro project. For this reason it is reasonable to think that Hydro might be in a position to finance an eligible project. There has been a problem obtaining liability insurance in the business. This is another area in which Ontario Hydro could assist small business, similar to the way that it assists public utilities commissions. The present five-year contract being offered is too short to obtain most financing on a project and should be raised to 15 or 20 years.

Another area that may have an adverse effect on small hydro is the way property tax assessments are done on small power stations. It seems that the Ministry of Revenue has come up with a formula that is used on large companies with hundreds of megawatts of installed capacity; in turn, this formula is applied to small stations without any correction factor. The result is an extremely high assessment that will likely be the determining factor on some of the marginal projects.

It seems that one ministry is promoting small hydro while another is

discouraging it. Something else that should be noted is that although there is room for improvement in the future, there have been significant gains in the past. The future for small hydro looks both exciting and challenging.

Mr. Chairman: Mr. Ashe, Mrs. Grier, and Mr. Cureatz. Let us start with Mr. Ashe.

Mr. Ashe: First, Mr. Dupuis, I want to congratulate you on your obvious initiative as a small businessman, obviously growing; that is great. It is a free enterprise system completely at work. I want to give you a little caution though, there are certain elements within the Legislature, a certain political party with a small s beside it that thinks some of the things you might be doing with some of your other people is bad, such as working 12-, 14-hours a day, six days a week. Be careful, you may be breaking the law pretty soon.

Mr. Chairman: You do not need to answer that.

Mr. Dupius: Out of the four people, three were family.

Mr. Ashe: I figured that, but you had one there who might be suspect.

Mr. Sargent: George, you could not miss a chance.

Mr. Ashe: That is right. Did I understand your presentation, at least the way I think you were saying it, that if somebody, an investor who did not really have his own expertise but who was willing to put in his own time, effort and talent to work and who was going into the exact same situation as you did and having to buy all the expertise, it would not have been viable. Is that really what you were saying?

Mr. Dupuis: Exactly.

Mr. Ashe: Okay. Did you get any indication from hydro as to why they would only offer you a maximum five-year contract?

Mr. Dupuis: We were told at the time that was their standard contract and applied to everybody. It sounded like it was something that was already in place. It still is to this date, as far as I know.

Mr. Ashe: It does not say you shall get 3.45 cents for five years but it says, "We will review it to see whether we want to do business with you again after five years at the then going rate."

Mr. Dupuis: It does say that the rate is floating and that they had not fixed the rate. When you take that to a banker, he says, "Tomorrow they could drop the rate in half." There is nothing in the contract saying that they cannot do that.

Mr. Ashe: It is probably important, from a businessman's point of view, that there should be something there that talks about a floor rate, at least. Obviously it would go up if the averages go up, which is really the initiative.

You mention a problem with the Ministry of Revenue on the assessment. How much out of line do you figure that is? For the moment, let us try to relate it on the basis of most assessments today. I appreciate you have a unique type of situation; it is not like it has other multi-uses and I

understand and accept that. In theory, it is somewhere based on the market value--

Mr. Haggerty: It is just a pass-through, George. It does not buy the water.

Mr. Ashe: I am not talking about water at all.

How far out of line do you think the assessment they put on you is relative to the market value of your company if you will? I appreciate it is all based on percentages and so on, and your income potential because it not straight--if it was a residential assessment, that is easy to talk about.

Mr. Dupuis: They have taken a formula that applies to Abitibi-Price and Great Lakes Power, which are very large utilities. One is a utility, the other one is a private company using the power themselves, but when you take that and scale it down for small hydro, for a 1,000 kilowatt station, in the case of Galetta, our assessment is not too bad and I am not complaining too much. It is the way they go about getting that assessment. When you apply that to a new generating station, the assessment would be about five or six times higher at Galetta. They have given us the benefit of the doubt because it is an old station, but we are proposing to build some new stations and we are afraid that this assessment is going to--

Mr. Ashe: You mean with all new equipment, it would be much higher. I will pass now.

Mr. Charlton: Can I have a supplementary on that?

Mr. Ashe: Sure.

Mr. Charlton: In terms of this assessment and the property tax, which part of that tax system is the most damaging, from your perspective? Is it the realty tax itself in the basic assessment or is it the business tax that is--

Mr. Dupuis: In this case the business tax is 60 per cent of the property assessment. Ontario Hydro was paying a grant in lieu of taxes. They were paying about $800 a year.

The first year we were assessed at $67,000. We did not think that was too bad but we said, "We only paid $50,000, let us appeal it." We did that and they lowered it to $36,500. That resulted in a tax lower than Ontario Hydro by $6,800 a year. The next year we were assessed a little higher, at $42,000. We did not bother to appeal it but I did get a phone call saying, "Ignore that one; that was incorrect." They reassessed us for $117,000.

Our taxes there, property and business are up to $3,000. I do not think that is an unfair tax for that generating station but if you could see the formula and how it was applied, if they had applied it to a new station, it might be as much as six or seven times that amount.

Mr. Cureatz: I have a supplementary on that. I have run into this continually with the new Darlington station and the municipality being concerned about grants in lieu of taxes; yet we are not playing fair ball because when it goes into private business, in terms of yourself, they are not looking in terms of a grant in lieu of taxes. You are getting the full bite of revenue in the assessment.

It seems to me that somewhere along the line in our discussions about cogeneration and small businesses, we should take a look at the disparity and what I would feel is an advantage that Ontario Hydro has of usually paying something in the way of grants in lieu of taxes, which would be less than the fair market value assessment; whereas for private individuals who start up, they are going to be disadvantaged because they are going to be assessed at what the true fair market value is. We are going to have to concentrate in terms of balancing that up.

Mrs. Grier: I am not quite as doctrinaire as Mr. Ashe; let me say how interesting and stimulating I find your presentation to be.

Mr. Cureatz: No, you are all right, Ruth.

Mrs. Grier: I may have missed this. What was your company doing before you got into this? Where did your expertise come from?

Mr. Dupuis: The company was really owned by my father and myself. He had a machine shop for about 25 years before Galetta came along that was powered by a small hydro electric installation. In 1977, it was flooded out by Ontario Hydro, who built the station at Arnprior. We built a new generating station on the nine feet of head that was left; we had 42 feet before.

It did not have enough power to run the business anymore but it does run some of the machines and also my father's house is powered by his own electricity. Now this system is separate from Ontario Hydro. We are not hooked up to the grid on that one. It is only 30 kilowatts and we do not have a three-phase line running in the house. We could hook up a single-phase but at this time we have been too busy with other projects.

11:40 a.m.

Mrs. Grier: What kind of approval process do you have to go through? I am thinking of the new projects you were talking about. Are you then subject to the Environmental Assessment Act and to municipal regulations? What has that meant to you?

Mr. Dupuis: We have four sites. We are working on one of them right now, but it was operating four years ago supplying power to a grist mill mechanically and all we are doing is adding a generator. We are not liable to an environmental assessment.

Mrs. Grier: You are not building new dams.

Mr. Dupuis: No.

Mrs. Grier: You are using existing--

Mr. Dupuis: Yes. Each of these four sites has a damn.

Mrs. Grier: They have not been used.

Mr. Dupuis: That is right. In one case, not since 1910; the newest was used four years ago.

Mr. Cureatz: This is an area I also want to address. I will ask a supplementary question and then get to some of my other concerns. I think that is an area where private industry would encounter some difficulties if you

were looking at a brand-new site you wanted to develop. Then you are looking at the whole Environmental Assessment Act.

Mr. Dupuis: That is a problem when you are looking at a virgin site. There are a lot of sites out there that had water power for many years but were not used through the years because of the low energy rates available from Hydro.

Mr. Cureatz: Have you put your mind to the problem of impact on a new site? You have not encountered it yet.

Mr. Dupuis: Not too much because as you say, we have not encountered it.

Mr. Cureatz: Speaking of practicalities, how much money did you actually spend on the purchasing? I want to get down to dollars and cents.

Mr. Dupuis: I do not think we invested more than $100,000. That does not include our wages. Had we been at fair market value, it would have been quite substantial. It did not make sense to pay ourselves a wage and pay taxes on that. We did the work for free, for ourselves.

Mr. Cureatz: What is your return?

Mr. Dupuis: Our year end is coming up at the end of this month. I do not know where we stand. Last year we had about a $30,000 profit. We put a lot back into the plant and we brought a lot of equipment.

Mr. Cureatz: That would be profit divided among how many?

Mr. Dupuis: There is just my father and I. We had a third partner for the first year but I bought out his shares.

Mr. Cureatz: What has been your background and expertise?

Mr. Dupuis: As I said, my dad had his own hydro power for 25 years. We built two other stations besides the ones my dad was involved in. Galetta was a big project for us at the time; 1,000 kilowatts when you are used to 30 is a big step. We were nervous about it but small hydro under 10 megawatts is very simple. There are not many problems associated with it.

Mr. Cureatz: When you made an agreement for Ontario Hydro to buy the electricity from you, was there a feeling it was locked into the deal, no matter what happened?

Mr. Dupuis: Have you read the contract? They are locked in but they could put you out of business.

Mr. Cureatz: I realize that.

Mr. Dupuis: It is not really a contract.

Mr. Cureatz: I am looking at it from two points of view. They could put you out of business. They could shut off the switch. On the other hand, we would hope that would not happen because the political repercussions would be so detrimental. We would hope their public relations would not be so poor that they would do that. On the other hand, you are sort of locked in because who else can you sell it to? There you are. The point I am driving at is, if more

of these individual areas flourish, what is Ontario Hydro's point of view? Is it more of a pain in the neck for them, running around dealing with all the small units?

Mr. Dupuis: Perhaps at this point it may be a pain in the neck. Hydro has to have an area in its organization that is well versed in small hydro. I think they have already started to do that. I have heard of an article in the latest Hydroscope. Apparently they have appointed somebody for the eastern region of Ontario to look after small hydro.

Mr. Haggerty: Ontario Hydro would not permit you to deal with local utilities over the purchase. We are talking about cogeneration. Perhaps that area should be left and the option should be that the local utility should be purchasing it. They could probably double the profit if they bought it.

Mr. Dupuis: Some of the nice sites in Ontario are inside the jurisdiction of public utilities commissions. In most case I have heard about, there has been a problem getting the same rate Ontario Hydro is willing to pay. You were talking earlier about reliability. If you take cogeneration and small hydro, and you have hundreds of people supplying power to the grid, if 10 per cent of them are out of commission for any reason at any one time, it is only 10 per cent of the system. When you are relying on large facilities for power, you do not have that insurance, if you want to call it that.

Mr. Haggerty: To go back to the assessments, is there another assessment that is applied to your industry? I am talking about water rentals.

Mr. Dupuis: On our river, the Mississippi River, we pay tolls to the Mississippi River Improvement Co. which is 78 per cent owned by Ontario Hydro.

Mr. Haggerty: You are paying water rentals on top of the property assessment too.

Mr. Dupuis: Yes. Last year I think it was $10,500 to use the water. Then we pay taxes.

Mr. Haggerty: It is just passing through your system in other words.

Mr. Dupuis: That is right. That is one way the people at the assessment office justified their assessment. They took what we were paying in tolls, capitalized that and said, "If the water is worth that much, your property must be worth this much."

Mr. Haggerty: They base it on the water rentals. I wonder whether they apply that same principle against a nuclear generating plant that pays nothing for water rentals and consumes enormous amounts of water. Do you think that is a fair assessment if it applies to the small private sector?

Mr. Dupuis: No, I do not.

Mr. Cureatz: This is not quite a question, but it is interesting for me in terms of your presentation, which I enjoyed very much. I have often been supportive of a Hydro package of not putting all our eggs in one basket in terms of nuclear, hydro, coal and oil. It appears to me that this is an area that could be developed, so that we do not put all our eggs in one basket, with the private individual supplying electricity to Ontario Hydro. That kind

of diversification should be complimented. I do not think it is always the case that big is beautiful in terms of Ontario Hydro.

Mr. Sargent: This is a shocking story of what Hydro has been getting away with for years. Here is a new kid on the block and Hydro does not bend over backwards to help. It is scary. Here we have the lid coming off the operation over the past 43 years. We have been lending hundreds of millions of dollars every year to firms that are in the excess profits brackets, from Westinghouse, etc., down the line, giving millions of dollars in forgiveness loans and grants. Here is a firm that has spent $100,000 of its money on a river with rights owned by Hydro. I back up Mr. Ashe in congratulating you. It is a great success story. I did not know about things such as this going on. I thought Hydro was doing a fair job. Who did you go to for help, for financing? To the Ministry of Energy or to Hydro?

Mr. Dupuis: We did our own financing.

Mr. Sargent: I know, but who did you go to for permission?

Mr. Dupuis: In this case, it was a plant that was already in place and there was nothing that had to be applied for. It was a matter of rebuilding the generating station and continuing to operate it. It had been run for up to two years before that by Ontario Hydro.

Mr. Sargent: For any permissions or grants, did you deal through Energy or directly through Hydro?

11:50 a.m.

Mr. Dupuis: Through Ontario Hydro. They took care of some of that paperwork. In their information package--I have it with me; it is quite a large document--they had gone to all the various ministries and asked what the implications were of selling this generating station. Did it have to apply for an environmental assessment? They showed us all the letters and the reasons why one did not have to.

Mr. Sargent: Does Hydro own the water rights?

Mr. Dupuis: Not really. They own part of a company called the Mississippi River Improvement Co. This was bought out years ago. The company was put in place in 1910. It operated dams on the Mississippi River to even out the flow. They would store water in the spring and then over the summer months pass more water. Ontario Hydro had a fairly large--large from my point of view--2.8 megawatt station at High Falls and there was Galetta. It managed to buy up the dams over the years to even out the flow. The other people paying tolls on the river, besides Ontario Hydro, are the public utilities commission for Almonte and, I think, one other small company that pays tolls.

Mr. Sargent: I guess you could draft some legislation you would like to see available to small entrepreneurs in this field.

Mr. Dupuis: I am like a fish out of water here. I am more at home with work boots and a hard hat. I think I should leave that up to you people.

Mr. Sargent: We could use more of you guys sitting around this table, I will tell you that.

Mr. Ashe: That is for sure.

Mr. Sargent: If you can think of some ideas so we can get a handle on what Hydro is doing in this area, we would like to talk about it in government.

Mr. Dupuis: One thing I have found in dealing with Ontario Hydro is that it is not as bad as it may sound. It is a very professional company and has aided us with a lot of aspects. We had problems getting a phone installed and at their own expense they did what was called a GPR report, a ground potential rise report, for us that would have cost thousands of dollars if we had had to do it. We were willing to live with the idea of not having phone service. They have bent over backwards in that respect. If there is going to be a lot of development in the province in the area of small hydro, I think the rates will have to increase.

Mr. Sargent: Are you going to need any new financing?

Mr. Dupuis: We have been talking to banks to borrow small amounts of money, but we have found it very discouraging.

Mr. Sargent: Have you talked to the Ontario Development Corp.?

Mr. Dupuis: Just to the chartered banks.

Mr. Sargent: Why should you have to deal with banks?

Mr. Dupuis: One thing about our company is that we lack the sophistication to put together a full financial package. We are willing to move along nice and slowly, the way we have been doing, and not borrow large amounts of money. I think in the next five years we can build two or three more stations.

Mr. Sargent: How did you know about getting to this committee?

Mr. Dupuis: I was invited.

Mr. Sargent: By the chairman?

Mr. Dupuis: Yes; maybe not directly. Larry Moore knows the operation at Galetta.

Mr. Sargent: I congratulate whoever got you here.

Mr. Cureatz: It would seem in terms of recommendations that from what he has experienced, there could be a better package for individuals so they would know the steps.

Mr. Dupuis: I will make copies of this presentation available to Mr. Moore and he can pass them out later.

Mr. Chairman: We can arrange for that to be done. If you leave your copy with the clerk, we can make copies and return it.

Next is David Argue of Passmore Associates International Inc. I think you were here in our fall hearings, Mr. Argue.

Mr. Argue: Yes, I was.

Mr. Chairman: You are not unknown to this committee.

DAVID ARGUE

Mr. Argue: I have prepared in a little more detail what I am going to touch on today. The handout that is going around now will be something for you to read at your leisure. I would like to thank you for this opportunity to address you on the subject of independent power production. I look forward to your questions after my short presentation.

I will structure my presentation around five questions. What are the benefits? What is the potential for developing small power production in Ontario? Should there be a limit to development? How can small power production be promoted? What are the options for government?

In my last appearance before the committee, I went over a number of the generic, what you might call social benefits, so I will not go into greater detail in that area, but I see it as a principal and important area of consideration for this committee. Further, I feel it should be compared to some of the adverse impacts of megaproject development on small- and medium-size communities.

What I do want to talk about is some very important questions. This is not a black and white issue. There are a number of important considerations you might consider as negatives to the integration of an independent energy strategy in Ontario. I want to touch briefly on the questions of reliability and control, which are major issues.

Concentrating power generation in the hands of a public corporation allows for a high level of security that ensures sufficient capacity and energy will be available. The evidence indicates that Canadian utilities have been successful in this regard. Considering Ontario's surplus capacity during the past 15 years, some might argue that Ontario Hydro has been far too successful in guaranteeing electricity availability, since the reserve margin is far above the traditional 20 per cent normally maintained.

This is sometimes referred to as the lumpiness problem, meaning that you try to forecast the requirements for power over a medium-term period and build plants that incorporate economies of scale that mean by the end of the test or actual period the full capacity of the plant will be used. Since central generation facilities require lead times of up to 14 years, and since Ontario Hydro must plan for both high- and low-growth scenarios, costly overcapacity is a major fixture of the central generation model.

I would agree that overcapacity is a lesser evil than undercapacity and that is something I am sure you are thinking about. The question is: Is independent power reliable? Can small power producers be depended on? Is there a security of supply? To answer those questions, I first ask you to consider the checks that the small power producer undergoes when developing a project. I believe the previous witnesses today have gone through that area, but I want to stress them.

First, the engineering feasibility must be established. The most up-to-date, proven equipment must be selected. Cost-effectiveness and dependability undergo intense scrutiny. When the project has been established

as feasible from the engineering standpoint, the proponent must then obtain financing.

Whether the financing is raised as debt or equity, management capability, market and technology are analysed by the financing entity. Financiers depend on the management skills of the small power producer to return the investment with capital gains and income. The entrepreneur's past performance, dedication, commitment and conviction are critical in the evaluation.

Without market acceptance, the management team will not create a successful business. Therefore, it is essential that the market for the electricity is proven and predictable in the eyes of the financier. I believe that Mike Dupuis covered that quite succinctly, given the existing short-term contracts and no-frill price for the product.

Finally, the technological feasibility of the project must be proven. Potential for construction cost overruns, less than expected reliability, and other factors are considered. Financiers will check that claims are not only reasonable but are also on the conservative side. The financial community in this province will serve as the key intermediary in protecting the province against the development of unfeasible and marginally feasible small power production projects.

12 noon

To illustrate the point and how intense the scrutiny can be, I recently spent an afternoon with an investment broker concerning a small hydro project. He told me the partnership document presented a good management team, it showed a proven and reliable client for the electricity and was technically sound. He was interested in handling the deal but he had one major concern: What if the river dried up? I asked him to clarify.

I showed him the parts in the partnership document that addressed low-flow periods. He was not concerned about low-flow periods. He was concerned that the river that had run for several thousand years might suddenly run dry. Finally, he realized that the probability of this occurrence was statistically insignificant. That is just a small example of the scrutiny that is undertaken before financing for a project is obtained.

I would agree with previous witnesses, we cannot take the United States experience and bring it back to Canada but similar financing considerations have had an impact in the United States. Of more than 1,400 operational small power projects in the United States, only two projects have failed.

Mr. Sargent: How many?

Mr. Argue: Two out of 1,400. That is the set number of projects that have had contracts cancelled.

Another point I would briefly mention is the impact on the dispatch decision-making of the utility; that is, briefly, which facilities the utility will use to meet the current demand on the market.

Although utilities cannot exert the same dispatch control on small power producers, they can contract for generation standards within modest boundaries. As proven by several US utilities, increments as low as 10 kilowatts can be successfully integrated into the dispatch decision-making of

the utility's system, By considering aggregate contract capacity and energy from all the small producers on the system and the detailed characteristics of time-of-day, at-will, high-capacity and low-capacity producers, the utility can plan its own dispatch decision-making.

These changes will require adjustment on the part of Ontario Hydro but it can be done without adverse impacts on the rate base or the prudent operation of the utility system.

The second question: What is the potential for developing small power production?

In considering the market potential for small power production, a number of factors must be considered. They were well illustrated this morning by witnesses so I will not go through those areas again. I find the major problem in looking at market studies for Ontario in various technologies is that they have been based on existing pricing considerations which will not encourage any development in this province in the area of small power production. I must underscore that point. Second, most of the studies have depended on secondary data which compound the problem of relevancy and accuracy in the consideration of the market potential.

The two biggest factors, and probably the ones that will take up the largest part of market share in the short term based on the consideration that buy-back rates will increase, would be cogeneration and small hydro. I have included in the documents some illustrations of the studies that have been done in those areas. We should look at the longer term which would be basically a 14-year period for the consideration of a further central generation facility development.

Of the numerous technologies that have potential in the medium term, I will briefly discuss fuel cells, photovoltaics and wind generators. Cost reductions and efficiency increases are ongoing in each of these technologies.

Fuel cells tested under both laboratory and working conditions indicate that these products have the potential to be cost effective by the turn of the century. Some of the companies in this area are even more bullish, predicting cost effectiveness by the mid-1990s. Every customer of natural gas is a potential user of this promising product.

Photovoltaics, the direct conversion of electricity from sunlight, has shown strong potential with continuing increases in efficiency and lowered costs. Only five years ago, the price per watt worked out to slightly more than $10. One manufacturer of amorphous silicon panels has achieved costs of $2 per watt this year. The United States Department of Energy is confidently predicting prices of $1 per watt by the turn of the century.

Research in low-wind generating turbines is continuing, again with efficiency improvements and cost reductions. In this regard, what will be the impact on Ontario Hydro if battery research, for example, in which there has been a lot of work, becomes more effective, particularly in the residential market, with these reductions in these areas, if the utility has not put in place and learned how to operate a more diversified generation system? I want to underscore that point.

The third question: Should there be a limited development? As mentioned previously, sophisticated dispatching by the utility has shown that small

power production can hold as much as 30 per cent of the overall capacity of the utility system without adverse impacts of a technical nature.

The fourth question: How can small power production be promoted? The developers of new projects indicate general satisfaction with the existing technical requirements for interconnection as set by Ontario Hydro. There is a general respect and appreciation for Ontario Hydro's competence in this area and most developers are pleased with the conduct of the Ontario Hydro employees with whom they deal in this regard.

They would like to see the availability of a number of standard, long-term contracts for different sales agreements, contracts that would allow for at-will, time-of-day, seasonal and firm capacity that accurately reflect the value of each option, given the existing utility system. These should be long-term, fixed-price contracts, as is the case in many jurisdictions in the United States.

Small hydro developers feel that the requirements of a monthly capacity factor of at least 65 per cent means that for part of the year, run-of-the-river developments earn only 2.45 cents per kilowatt hour. The result of the 65 per cent capacity criterion is that many developers are considering underbuilding in capacity, resulting in spilling hydraulic potential during spring runoff in order to make sure that during the low-flow times of the year the capacity factor holds above 65 per cent. They do not understand why their developments should be treated any differently from the way Ontario Hydro treats its own hydraulic facilities where availability of the resource is a major consideration.

There is also a problem with backup, supplementary, maintenance and interruptible power rates, which would have major impacts, particularly in cogeneration projects. Whether the electricity is used totally on site or sold back to Ontario Hydro, the utility does not have a standard way of dealing with this issue. For this province to realize the potential of small power production, Ontario Hydro should provide supplementary, backup, maintenance and interruptible power on a nondiscriminatory basis.

Typically, utilities structure their retail rates to encourage the use of electricity. Charges per kilowatt hour decrease as consumption of kilowatt hours increase. The Public Utility Regulatory Policies Act, the US legislation, recognized the standard utility pricing schedule as an inhibitor to on-site electrical generation. Under that legislation, the small power producer is protected from an increase in unit charges from the uitility, even with a significant drop in the small power producer's utility demand. In implementation, most state regulatory agencies have required utilities to supply power to the small power producer at the best available rate.

Before addressing the power purchasing pricing methodology of Ontario Hydro, which with the time available I can touch only briefly today, consideration should be given to the economic impact of existing small power producers.

The power purchase rate was raised from just under two cents a kilowatt hour in December 1984 to 3.3 cents per kilowatt hour for facilties having a capacity factor of more than 65 per cent, and to 2.3 cents for capacity factors of less than 65 per cent. Hydro announced that the price would be increased by the consumer price index rate in succeeding years. Ontario Hydro

considered the impact of the new prices in a memorandum to the board of directors, from which I quote:

"The new rate level would have resulted in an increased cost to Ontario Hydro in 1984 from $363,000 to $414,000 for the 4.5 MW of parallel generation presently connected to the system and could have resulted in an increase from $6 million to $8.4 million if the estimated potential 40 MW of parallel generation had been connected in 1984."

12:10 p.m.

In 1985, from my best estimations in talking with small power producers, Ontario Hydro paid between $3 million and $5 million. To put this figure into perspective, it is less than half the cost of keeping the Rolphton research reactor operational for one year.

Mike Dupuis mentioned how Ontario Hydro could not afford the Galetta facility. The Dupuis are a credit to the entrepreneurial skill and talent in this new industry and have provided an example of what can be done. I have one additional example to buttress the previous witnesses' testimony. I am working with a client, the Nova Scotia Power Corp., which costed a 225 kilowatt small hydro plant at $950,000. We completed the construction of that facility for $245,000. Why was there such a wide range in costs?

Like other utilities, Ontario Hydro has oriented its planning and supply strategy around a limited number of central generation options. Market forces, technological development and a host of other factors have contributed to this development strategy. This approach was correct, necessary and even economically beneficial to the economic development of Ontario during the first half of this century. However, over the last decade, rapid changes in fuel and technology have dissipated the former economies of scale that once made central generation prudent in the larger market.

However, the corporation has an infrastructure that is highly specialized and trained in the development of multimegawatt central generation facilities. When faced with any project, whether 500 kilowatts or 500 megawatts, a variety of employees from numerous divisions are called upon to play a part in the successful development of that project. It is not hard to appreciate why a utility, oriented towards large projects, has difficulty with cost-effective small projects.

As I have mentioned, the power-purchase rate or buy-back rate is the major concern of the new industry in this province that is looking at the potential for small power production. They want a rate that accurately reflects Ontario Hydro's long-term costs for adding new capacity. Remember, it is in the interests of small power producers that the rate does not have a negative impact on the rate base.

The existing pricing formula is based on the assumption that Ontario Hydro will continue to operate and plan, much as it has in the past. The value of small power production is treated as a separate entity to the theoretical operation of Ontario Hydro over the next 20 years. The small power production option is not compared to the utility's options.

I will draw to your attention a few of the problems with the existing methodology.

One is the use of incremental system values of power and energy approach

to form the basis for deriving power-purchase rates. This approach, in examining and comparing incremental costs, is a useful planning tool for comparing internal utility options. For example, it provides a basis for determining the cost of supplying an additional kilowatt hour to a customer over the next 20 years. It includes the total cost of supply and not just the generation part.

The incremental kilowatt beyond 1998 is based on a mix of new generation. The incremental kilowatt is based on the production of an additional kilowatt from the cost estimates for the reference designs of a four by 850 megawatt nuclear facility, four by 500 megawatt US coal-fired facility and 500 megawatts of oil capacity. The mix of new generation chosen employs economies of scale that do not reflect what the utility would build, with or without the inclusion of small power production--unless Ontario Hydro is suggesting that it is going to add 5,900 megawatts of capacity. At any rate, capacity costs should be considered in terms of actual costs, not incremental costs.

The effect of adding this new generation on the energy costs of the existing system are considered. As we know, Ontario Hydro would not consider adding new capacity unless such capacity reduced general system costs. As a result, the energy factor is reduced without taking into account underutilizied capital capacity from those facilities. Hydro takes a rough figure from this approach and brings it down to an average hourly kilowatt rate and then multiplies it by a factor of 0.644, which is the generation transmission split of Ontario Hydro.

Since the costing figures it uses are basically for internal utility use rather than considering and comparing small power production with utility options, it is prudent to take into account those transmission costs, but the actual rate--and I am specifying the actual rate of 0.644--should not be similar to the present Ontario Hydro generation-distribution split. A small power production strategy does not require the continued expansion of the grid.

I could go on to list a number of other problems with the Ontario Hydro methodology, but I will only say that it is not an appropriate way to determine a power purchase rate.

I will make one further comment on how the power purchase rates were computed. Based on the Ontario Hydro methodology, the uniform rate for 1985 should have been 3.47 cents a kilowatt-hour. This is the sum of the uniform energy rate of 3.28 cents and the capacity value of 0.19 cents. The last line of the description of the methodology says a great deal about Ontario Hydro's opinion of small power production: "Reduce to 85 per cent of average wholesale rate = 3.3 cents a kilowatt-hour."

The rationale for this reduction was explained by Ontario Hydro as its taking responsibility for the metering and administration costs resulting from this program. Administration is not a relevant cost to include in this consideration of small power production. Metering cost should be assumed by the small power producer and not incorporated in the rate he is paid.

What are the options for government? I recommend the following initiatives:

The select committee should direct Ontario Hydro to encourage the small power production option as the utility's first source of new supply.

The select committee should investigate and determine an appropriate methodology for determining power purchase rates. The methodology should accurately compare the small power production option with the utility option for new capacity. The long-run differential revenue approach and the peaker approach, used in several jurisdictions in the United States, are suggested as broad models.

By provincial executive or legislative order, the Ontario Energy Board should be given detailed guidelines and be empowered to establish power purchase rates on a year-to-year basis. Levelized power purchase prices should be set on the basis of the best available information for the duration of the contract, which is similar to how Ontario Hydro plans.

Backup power to the small power producer should be made available at the best available price.

Mr. Moore: You raised the point that metering costs should be assumed by the small power producer. I was under the impression that Ontario Hydro's willingness to take on all metering costs was a particular benefit to small power producers because they are looking at a cost of several hundred dollars a month to run a digital readout meter. That is a tremendous disincentive to a small power producer.

Mr. Argue: The traditional split in metering costs in the United States--which I will mention in this regard and say why it is a discouragement for certain types of projects--the metering portion, the actual capital equipment cost for that, should be financed on a long-term basis, as it is in the US by the utility, and paid back over the term of the contract, as is done in many jurisdictions. There is not this immediate upfront cost part and it is amortized at the same rate that Ontario Hydro would cover it.

The important part is that if you put it on a flat term, then you are saying that the costs for metering a 10-kilowatt facility are similar to those for metering a 10-megawatt facility. That is where I see the problem. It discriminates against the larger projects. The amount of money that is coming back from that difference between the actual rate and how they have brought it down to 85 per cent of the wholesale rate in a large project would far exceed the actual metering cost.

Mr. Haggerty: One of your recommendations is that where there is a disagreement in the buy-back purchase of power from a small developer or a small cogeneration plant, whatever it may be, the Ontario Energy Board should be the deciding factor and act as an appeal system.

12:20 p.m.

Mr. Argue: I do not want to bring the US model back but PURPA is a very broad piece of legislation. Basically, the state public utility commissions decided how they were going to implement those broad recommendations, but they have to be given guidelines for how they are to interpret them. That is a political decision rather than a regulatory decision.

Mr. Haggerty: You think this would be a fair way to take a look at that.

Mr. Argue: In the longer term.

Mr. Haggerty: An independent body to review it.

Mr. Argue: That is correct. We want to work with Ontario Hydro, but it is very difficult to work with someone who sets the rules and negotiates with you. We have no leverage in negotiating with Hydro at this time. Even with utilities that work very closely with small power producers--and I can mention the Californian and some Northeast utilities--price is going to be a contentious issue.

It should be put before a body where proponents on both sides of that question can come in and take an intense look at the cost that the utility would assume if it had to generate the additional capacity. An independent body can weigh the arguments on both sides and establish a price.

Mr. Charlton: On this question of price, the buy-back rate, you dealt at length with that question, and we understand its importance to the whole question of small power generation. Should there be more than one rate, as well as having a rate established by an independent body? Should there be more than one rate for different kinds of projects? For example, should the rate be different for firm power as opposed to interruptible power and other kinds of questions that Hydro has to consider in its day-to-day operation?

Mr. Argue: I can touch on that question. I provided Mr. Snell with some background information that shows the various ways that one rate can be adjusted to reflect the value of different types of generators. I see a trend now in California because of the surplus situation. What we are seeing in the short term is, for example, a new cogeneration facility generating for only two hours a day into the grid system; two hours in the morning while they are firing up their boilers. The time-of-day rates are very important, but it is all brought back from the benchmark price. You can figure in capacity factors that take into account the capacity factor of the small power producer or how long the contract is going to be. It can be derived from one benchmark price.

To derive that benchmark price, however, I point out my second recommendation to you, which is that I am not comfortable with the costing figures Ontario Hydro has given to you. I have been involved in interventions in the United States and I have rarely seen a utility presentation of facts and figures that does not sometimes miss some figures that should be costed into that area. That is a very important task this committee should conduct, to measure, as a basis to start off, what we are talking about and what the real benefit of small power production would be.

Mr. Charlton: You are suggesting an independent body to set a price and to review that price on an annual basis, I assume.

Mr. Argue: On an ongoing basis.

Mr. Charlton: And a format for adjusting that price to the specific circumstance.

Mr. Argue: Yes. Determining buy-back rates involves both qualitative and quantitative judgement. It is not a black and white issue. There is no computer program into which you throw the figures and out at the end plops a price. There are a lot of judgement decisions to be made in the consideration of what a fair buy-back rate is. I feel the fairest way of doing that is to allow both sides the opportunity to address that issue.

Mr. McGuigan: I want to compliment Mr. Argue on this presentation.

It is the type of thing that we can get our teeth into when we come up with making our recommendations. I want to point out one thing to him that I found particularly interesting. Ontario Hydro has said, "Reduce to 85 per cent of average wholesale rate = 3.3 cents a kilowatt-hour."

I do not know what other gas utilities' policy is, but are you aware that Union Gas has an offer to purchase to anybody who has gas available, and that includes a number of people in southwestern Ontario who may have a small well? They pay 95 per cent of the gate price.

I do not know whether it is a Toronto gate price or the Manitoba-Ontario border, but it is a structured price rate on which they base their wholesale distribution costs from that point. They call it the something gate price, 95 per cent instead of 85 per cent. Here you have a privately and publicly owned company with a better purchase price than a company that is owned by the people of Ontario.

Mr. Argue: In that regard if you want to prevent the development of small power production, you establish a benchmark in your wholesale rate product. You have to split the two functions of a utility, the distribution and the generation side. What we are talking about here is the generation side of the utility's business. Consideration of the wholesale rate price is not relevant to consideration of the buy-back rate.

The Vice-Chairman: The committee stands adjourned till 2 o'clock. Our witness at that time will be Peter Miller.

The committee recessed at 12:28 p.m.

SELECT COMMITTEE ON ENERGY

ELECTRICITY DEMAND AND SUPPLY

THURSDAY, APRIL 10, 1986

Afternoon Sitting

SELECT COMMITTEE ON ENERGY
CHAIRMAN: Andrewes, P. W. (Lincoln PC)
VICE-CHAIRMAN: Ashe, G. L. (Durham West PC)
Charlton, B. A. (Hamilton Mountain NDP)
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Gordon, J. K. (Sudbury PC)
Grier, R. A. (Lakeshore NDP)
Haggerty, R. (Erie L)
Jackson, C. (Burlington South PC)
McGuigan, J. F. (Kent-Elgin L)
Polsinelli, C. (Yorkview L)
Sargent, E. C. (Grey-Bruce L)

Substitutions:
Brandt, A. S. (Sarnia PC) for Mr. Jackson

Clerk: Carrozza, F.
Clerk pro tem: Mellor, L.

Staff:
Moore, L., Adviser, Electricity Section, Policy and Planning Division, Ministry of Energy
Richmond, J., Research Officer, Legislative Research Service
Snell, B., Consultant; with Canada Consulting Group Inc.

Witnesses:

Individual Presentation:
Miller, P., Energy Consultant

From Engineering Interface Ltd.:
Tamblyn, R. T., Chairman
Tamblyn, B. T., President

LEGISLATIVE ASSEMBLY OF ONTARIO

SELECT COMMITTEE ON ENERGY

Thursday, April 10, 1986

The committee resumed at 2:08 p.m. in committee room 2.

ELECTRICITY DEMAND AND SUPPLY
(continued)

Mr. Chairman: Committee members, we have Peter Miller before us this afternoon. Please carry on, Mr. Miller.

PETER MILLER

Mr. Miller: Good afternoon, Mr. Chairman and members of the committee. I want to thank you for the opportunity to speak here. I hope I can assist in your task of securing an independent and efficient energy future for Ontario.

My name is Peter Miller. I am a private consultant on energy policy and conservation. I live in Washington, DC. I am currently involved in the analysis of appliance standards for the state of Massachusetts. I am doing the forecasting of savings and the impact of standards. I participated in the California Energy Commission proceedings on refrigerators, air conditioners and heat pumps recently. I delivered or assisted in the preparation of testimony on appliance standards before the Northwest Power Planning Council, the Oregon Legislature, the Florida Legislature and the Massachusetts Legislature. I have also been involved in the United States Department of Energy review of appliance standards. I hold a master's degree in resource systems and policy design from Dartmouth College and a bachelor's degree in physics.

My goal today is to explain to you the rationale for appliance and building standards and their potential role in an energy future for Ontario. I will begin by reviewing the current status of standards in the United States, in California, in Massachusetts and at the federal level. Second, I will discuss the process by which a region, a state or a nation develops and adopts standard levels. Third, I will present the issues raised in establishing those standards. Finally, I will conclude with recommendations for possible programs for Ontario.

Currently, standards are being debated, adopted or reviewed in a number of states. California in particular has a very strong standards program. It recently revised its efficiency standard for refrigerators, freezers, air conditioners and heat pumps. Projected savings from the standards, which were first adopted in 1976 and enforced in 1979, are 13,000 peak megawatts by the year 2000 and well over $10 billion in savings to consumers in the state from those standards.

Massachusetts is currently looking at standards. It has a bill in the Legislature that has cleared one committee that would adopt standards for appliances. Along with three other people I am doing the analysis of the impact of the standards for the state, and our forecast is that if it adopts the first tier of standards, which are the standards it is actually going to bill now, low-level standards that would come into force in 1988, it would

save US$1 billion for the consumers of the state by the year 2000. If it adopts the second tier of standards, which are roughly equivalent to the 1992 and 1993 California standards for refrigerators and air conditioners, it would save another US$500 million and a total of 1.5 billion average megawatts of capacity within the state by the year 2000.

Mr. Brandt: May I interrupt at this point? Could you mention the attendant costs associated with those savings? Is there a counterbalancing cost figure that would find its way through the system based on the two tiers of the bills that you mentioned?

Mr. Miller: I do not have a figure offhand that would correspond directly to those costs. I assume you mean that it would be the increase in first costs.

Mr. Brandt: Let me explain it this way. If there is going to be an energy saving as a result of building a better appliance, and if that is contained in a bill, the first or second tier that you mentioned, that is the energy savings side; but ostensibly there would be more insulation, different types of motors and so forth. Ultimately the consumer also pays for that.

We had presentations yesterday that looked at those two factors in some detail, and I wondered whether you had any idea of what the flow-through costs will be that will ultimately have to be paid by the consumer. Are you just robbing the left pocket to put the money in the right pocket, or is there an overall benefit to the consumer?

Mr. Miller: Yes, there is a significant overall benefit to the consumer. I guess when they estimate the cost--and that is the incremental first cost due to the efficiency improvements--it is about 20 per cent of those savings. I also point out that those savings do not include savings from a reduction in the more expensive peak power and any other secondary costs, such as environmental benefits and reduction in sulphate emissions. Those are basically direct energy costs and current utility rates. The attendant increase in first costs would be about 20 per cent of that.

Mr. Polsinelli: Is that 20 per cent of the value of the appliance?

Mr. Miller: No. The additional incremental first cost for the efficiency measures is 20 per cent of the net savings from those measures.

Mr. Brandt: That is 20 per cent of $1 billion.

Mr. Miller: That is a conservative estimate. It is probably lower than that, but it is somewhere around there.

Mr. Brandt: If I might, this is a key point. I did not mean to interrupt you for a long period of time during the course of your presentation, but I just want to understand it. At the first tier, as you called it, the first level of the bill, there would be $1 billion in energy savings. In answer to Mr. Polsinelli's supplementary, you said that the 20 per cent relates to a $200-million expenditure to realize a $1-billion saving. Is that what you are saying?

Mr. Miller: Something like that.

Mr. Brandt: If you went to the $1.5 billion, would it then be a $300-million cost? Does the 20 per cent hold at the second tier as well?

Mr. Miller: Yes. I must caution that these are somewhat off-the-cuff estimates; I do not have a dollar figure with me. Knowing the specific costs involved with increasing efficiency in appliances and trying to estimate over the whole range of appliances--with some appliances it is very inexpensive--the cost and benefit ratio may be much less than that; in fact, it is, maybe one to 20 or one to 30. For some appliances it is much lower; it could be one to three or one to four.

Mr. Brandt: My apologies for interrupting you.

Mr. Miller: That is fine.

Mr. Snell: May I also interject here to clarify? Mr. Brandt, you may not be clear, and Mr. Miller, you can help me if I am wrong. The supply curves we saw yesterday from Art Rosenfeld said that at such-and-such number of cents per kilowatt-hour you can get so many savings. They do the supply curves for different appliances or building standards, and they usually determine that below the marginal cost of the utility they will decide to bring those in.

How do you bring them in? One way is through efficiency standards. There is an estimate of the cost per kilowatt-hour of each of these savings before they decide whether to bring them in. They do not just say, "We can save $1 billion and that might cost us $1.2 billion."

I think what was unclear and what I wanted to make clear is that certainly there are very rigorous methods of estimating the costs of bringing in these things in advance and it is decided that the cost is cheaper than the cost of generation at that stage. The savings are not just brought in without any estimate of the cost at all.

Mr. Brandt: Another reason I stopped Mr. Miller at that point is that I wanted to get some indication of what the real cost was and to whom, because ultimately the consumer pays. Either it is a flow-through cost to the appliance as a result of its being constructed more rigorously or to higher energy standards or, on the other side--and I do not think the question of developing more energy and the concomitant problems associated with that are lost at all to this committee--there are the environmental factors, the peak power costing, the difficulty of nuclear energy in some people's minds, etc.

If there is a way to get a balancing point or to get the two figures reasonably in balance where you can delay a $1 billion of cost in new energy simply by spending $1 billion in conservation, that kind of tradeoff makes sense to a lot of people, myself included. You have to look at that as being a realistic kind of thing.

I am in debate now; I do not mean to do that, but I will end quickly.

You might get to the point where you pay more on the environmental and conservation side rather than move towards the energy side. I can see that kind of tradeoff being a realistic factor at some time as well, but I wanted to get the cost relationships into balance with your presentation.

Mrs. Grier: I am sorry, but I thought I was clear. Mr. Brandt has just managed to confuse me again. The $1 billion that I heard Mr. Miller mention I thought was direct savings from energy use; it was not avoided cost of new generation. Am I correct?

Mr. Miller: That is correct. That is the reduction in the utility bills that people will be paying during the next 15 years.

Mr. Brandt: Which ultimately delays the need for further construction of new power-generating facilities.

Mr. Haggerty: You and I were on the right track this morning, were we not?

Mr. Brandt: That is right.

Mr. Chairman: Okay. Can we go back to the presentation?

Mr. Brandt: Mr. Miller and Mr. Chairman, I am sorry.

Mr. Miller: I will review quickly. In the Northwest there is a lot of activity in conservation, which I am sure you have all heard about. They recently adopted a fairly stringent building standard that will secure quite a bit of conservation. It will take effect in 1989. They currently have an incentive program whereby the utility pays the extra first cost of the efficiency measures in the buildings and homes until the standard takes effect.

The US Department of Energy is looking again at appliance standards. A recent court decision has it reinvestigating appliance standards. It will be looking at the maximum feasible technological level, and it should have standards in two or three years, which will take effect a couple of years after that.

2:20 p.m.

First I want to talk about Ontario and how you might develop standards here. To do that I want to emphasize that the starting point is not standards but the development of a reliable energy system for Ontario at the least cost to the region.

Standards are one of the possible policies you can adopt to do that. Standards take advantage of the conservation resource that is inherent in the current buildings and appliances. As such it is a policy you can use to help develop an efficient energy system. It is not something you would do in lieu of building generating plants; it is something you might do in concert with it; it is along with energy labels, incentive programs or rebates. They are all policies you can use to help develop the conservation resource that is available.

The first step you would take to develop that resource is to evaluate it. Just as you would want to know how much it would cost to get kilowatt-hours out of a nuclear plant, you would want to know how much it would cost to get kilowatt-hours out of conservation. The first step would be a technical evaluation of how big the conservation resource is and how much you can get for whatever price. If you spend enough you can get a lot; if you spend a little you can get a fair amount. You develop a conservation curve, a cost curve of cents per kilowatt-hour.

Given that--and that is a fairly detailed step--you would compare it to the other resource options that are available. They include hydro, coal, other forms of demand management and nuclear power. You decide which ones are necessary to meet the forecast demand. You have some sort of forecast of demand and you say, "We will need such-and-such power and we will take the

cheapest ones, the most reliable ones that are available to us." You compare them across the board.

A direct economic comparison of cents per kilowatt-hour may not be appropriate. In the Northwest they give conservation a 10 per cent advantage for a number of reasons, including lower risk, uncounted environmental effects and a number of other reasons. Therefore, a direct economic comparison may not be what is called for, but there should be some sort of comparison so that you develop the least-cost resource. That is what should be done.

In evaluating conservation there are a number of costs and benefits. This comes back to the question you raised earlier about costs. There are technical costs, which are the increased first costs of the efficiency measures. What is the incremental cost of adding more insulation on a house? What is the incremental first cost of a more efficient compressor in a refrigerator? In evaluating the conservation cost curve it is not important who pays for it, just what it is. When you decide how to develop it, who pays for it will become a crucial question.

Costs can be handled in a number of ways. Someone has to pay for it, and it can be compared with other costs. You are going to have to pay to develop that power somehow unless you are going to run out, which is certainly not desirable.

There are also institutional costs in developing conservation programs. There are administration, enforcement, testing and education costs. Those tend to be fairly low. In California the administration of appliance standards is approximately $100,000 a year, which includes a random survey to make sure that people are complying. However, the administration costs tend to be fairly low. The startup costs can be higher and, of course, there can be costs for rebates and incentives.

Mr. Haggerty: Are there rebates for appliances in Massachusetts, too--bonuses, rebates or whatever terminology you want to use?

Mr. Miller: Massachusetts currently does not have those sorts of programs. There is a program for refrigerator rebates in California, and that would be an added cost to the program.

Mr. Haggerty: That is the only state, then.

Mr. Miller: No. There are other states that have rebate programs. There is an air-conditioner rebate program in Texas. I am not sure it is limited to Texas; it is in the Southwest.

Mr. Haggerty: Does the utility bear the cost of these rebates, or is it a government-sponsored program that refunds it?

Mr. Miller: The utility bears the cost of the rebate. In the Northwest there is a rebate--it is not really a rebate; it is basically an incentive. I am not sure what you would call it, but the Bonneville Power Administration pays the increased first cost, the extra first cost, through to the required efficiency measures. The home owner pays the same price for the house and it pays the extra first cost. Bonneville Power is a public governmental organization. It is not a private utility but a public utility paying in that case.

Equally important is the benefits side. The economic savings are typically the first thing you look at. As I mentioned earlier, the electricity bills are reduced because you have more efficient appliances that use less electricity. There are savings to the utility. It is investing in a less expensive, more efficient resource. There is the benefit of certainty which is a significant benefit that is often overlooked.

Look at the first slide. This is something I skipped over earlier. This is our forecast of demand under the two different appliance efficiency scenarios we have developed and under a scenario called frozen efficiencies which keeps these at current levels. This would be the demand from household appliances under those three different scenarios to the year 2000. That is our forecast assuming efficiencies stay frozen either at current levels or at the two different standard levels.

In the third slide, the actual situation is closer to this graph. When you try to forecast demand, clearly there is a lot of uncertainty in a situation. You do not know exactly what the demand is going to be. These shaded areas represent that uncertainty.

Market efficiences have no standards. You let market forces determine where standards will go. It is possible they could decline from current levels as they did during the 1960s and early 1970s, or they could increase, which is what most people expect them to do. You have a wide range of demand possibilities. Under the standards, you have set a minimum level and they can increase above that to a certain extent. You have a certain amount of uncertainty in that scenario too, but it is greatly reduced.

The savings are important to the consumer, but the demand uncertainty is critically important to the utility when trying to forecast demand and decide what power plants to build or what resources to develop. If the demand for which they have built a plant does not materialize, that can be a big problem. In the Northwest, they know very well the value of increased certainty in demand forecast after the default of the Washington Public Power Supply System. This certainty is a significant benefit from conservation. You have increased confidence not just because you have developed a different resource but because you have started to manage demand. You have started to manage the energy use.

I should make it clear that these conservation programs do not require any change in lifestyle, amenities, appliances or households. In fact, they usually increase the amenity or the value of the appliance or the house. When we talk about the efficiency of a refrigerator, it means more insulation or a more efficient compressor. It does not mean you cannot have through-the-door ice. For instance, in the California standard there is a specific provision that pertains to through-the-door ice makers and allows manufacturers to increase the minimum energy consumption per refrigerator if it has that feature. There is no impact on amenities at all. Generally, there is an improvement in quality of houses in that you do not have draughts. Of course, one thing that is limited is that you cannot buy a very inefficient refrigerator. You cannot buy a gas-guzzling refrigerator or appliance. That is the one limitation of the market that these incur.

2:30 p.m.

Going on with the benefits, the third area is the environment. By reducing the need for fossil fuel combustion and new construction, there are significant environmental benefits. Those are difficult to quantify, but should be included in the cost-benefit analysis.

There are benefits to employment. Conservation typically has greater employment benefits as compared to central generating stations, up to four times direct onsite employment. The employment tends to be local, long term and tends to require locally available materials rather than imported materials and talent. You tend to increase local employment certainly more than as compared to central generating stations.

Mr. Snell: Mr. Miller, how does the standard increase employment? I do not understand how, compared to a generating station, it would even be comparable in employment. Or are you referring more to a conservation program as opposed to standards themselves?

Mr. Miller: No, it does apply to both. The issue is clear with buildings, in which there is more value added to buildings, more work to be done to buildings, more conservation, more investment in the building than in the utility. You are putting more work into the building and making a better building to start off with, and that takes more work, it takes more investment and it takes more materials.

Mr. Haggerty: Is there not more energy involvement too? Would you increase the input of energy in the sense that if you are going in and retrofitting all these buildings, you are going to increase your need for energy more than ever?

Mr. Miller: You are not going to increase it as much as it would require to heat the house if you put the insulation in. There is energy involved in making the insulation and a small amount involved in installing it, but not very much.

Mr. Haggerty: What are we looking at in numbers? Are we increasing the gross national product if we get into this area here?

Mr. Miller: I am not an economist. My impression is that there is significant--I am not sure what the term is but since you are investing in local--

Mr. Haggerty: There is a spinoff.

Mr. Miller: Right. You are investing in local business, local industry and local employment. I do not know what you call it, but there is a spinoff factor or something.

Mr. Haggerty: I would be looking at the adverse effect to it. If you get into the thing, you are increasing the GNP in employment, for example, and that tells me one thing. Once the economy starts moving up this way, even one per cent or half a per cent, the end product is that you are going to need more energy to keep the industry going.

Mr. Miller: The goal is not to keep total energy consumption down but to use the energy you have efficiently. As I said earlier, investing in conservation does not mean you cannot invest in nuclear power plants. There is no contradiction there at all. What you want to do is use the energy that is available as efficiently as possible.

Mr. Haggerty: To look at this thing in perhaps more depth, the US has followed this principle of conservation. I am not opposed to conservation; the point I am trying to get at is that in the 10 years they have been in the conservation thing, a time is going to come, that one-time shot, when your

economy does turn around. They have been forecasting that it will. Then the question is, what do you do for required energy to supply the upturn in the economy? If you mothballed your plants or cut back on completing the plants, where do you look for electricity then, the source of energy that is going to--

Mr. Miller: You find the least-cost resource available. If that is conservation, you develop the conservation resource; if it is hydro, you develop hydro; if it is nuclear, you develop nuclear. I am not clear why investing in conservation now should change any sort of investment decision.

Mr. Haggerty: In the long run they are forestalling the need for additional facilities to generate electricity. They may get into the crunch of where do they go now; they have gone into this area of conservation for the last 10 years and, all of a sudden, they are faced with a shortage of electricity. Where do they get it from?

Mrs. Grier: Could we finish the presentation?

Mr. Ashe: We are lost here. The chairman has returned, Mr. Haggerty.

Mr. Haggerty: I noticed that.

Mr. Chairman: I am going to ask Mr. Miller to carry on.

Mr. Miller: I will go quickly to the last area of benefit, the business sector, which benefits from market certainty. They know where the plants are that they are going to have to build in the future. They know how efficient people will need their houses to be. It allows them to remain competitive in the face of foreign competition. The Japanese are building very efficient refrigerators now and starting to introduce them in the US. It allows businesses to tool up now for what the demand will be five or 10 years from now and not be caught unaware.

It also benefits business and the region in general by keeping energy prices stable and low, which you certainly have here in the past and up to the present. That is something that should continue and this can help do that.

Once you evaluate this conservation resource, compare it to the other ones and decide you want to develop this conservation resource, there are a number of policies you can adopt to develop that resource; that is this slide. Basically I divided the different policies into three different groups.

The first is the market forces approach, which is basically the do-nothing approach. Everybody assumes that appliance and building efficiencies will increase because as energy prices increase and as technologies become available, you can say: "They will increase by themselves. We will let the free market determine where they should settle."

There are some benefits to that approach. It is expensive. You do not have to do much about it. It is easy and there is no interference in the free market. I do not know how important that is here; it is an issue in the US at this point.

There are also a lot of drawbacks to the approach. First, in terms of long-term demand, you do not know what will be the impact of that. There is a lot of uncertainty. In the 1960s, efficiencies declined in a lot of appliances. In the late 1970s, they increased dramatically. In the 1980s, oil prices are now down, electricity prices are stable, and it is not clear what

is going to happen with appliance efficiencies or building efficiencies. That uncertainty in demand creates a large risk. That is very significant to the utility.

The second area of approach, marketing programs, has been tried here and includes rebates, labels, incentive programs, shared savings programs, advertising programs and a wide range of possibilities. The benefit of this is that it increases consumer awareness. You are advising people what they should be doing. You are letting them know what the opportunities and possibilities are. You are encouraging them to do what is in their own best interests. You are relying on that. You are not interfering in the market.

There are some drawbacks to that and one is uncertainty. Again, there has not been a lot of study done on rebate and labelling programs. It is not clear; the results are mixed as to the actual effect. Similarly with incentives and marketing programs. Philco, a refrigerator company, came out in the late 1970s with an energy-efficient refrigerator and advertised it on the basis of that. It told people how much money they could save. It went out of business; it did not work.

Mr. Chairman: The refrigerator did not work or the marketing program did not work?

Mr. Miller: Apparently the marketing program did not work. The refrigerator company went out of business. Refrigerator efficiency is very uncomplicated. Basically, it is simply more insulation and a more efficient compressor that gets you three quarters of the way there.

One interesting issue comes up in this. These appliances and buildings are in the consumers' own interest; on an efficient refrigerator, you can save $1,000 over the life of the refrigerator, the 20 years that you own it. You are investing an extra $100 at the first cost but you get a payback in a couple years.

If it is so much in their interest, why do you have to offer people $50 to pay for it? One theory advanced by the Bonneville Power Administration is that all you have to do is get people's attention focused and expand the marketing program. In the advertising say, "Look, you can save $1,000 if you buy this." That may be all that is required. They are trying that. It is not clear what will happen. In general, rebates and incentives and these labels have a role to play but again they do not give you a lot of certainty in terms of long-term demand.

The third area is standards. The benefits are fairly inexpensive to set. You establish a standard; there is some checking up to make sure the people are complying and there is research involved in establishing them. Other than that, it is fairly inexpensive to establish and the savings are large.

2:40 p.m.

The estimate of savings from rebate and incentive programs is approximately one fourth the estimate of savings from similar standard programs. There is a significant reduced risk. The uncertainty in forecast demand is greatly reduced so it is much easier to forecast and develop resources to meet that demand.

The drawbacks are that you are interfering in markets. You are saying you cannot sell an appliance below a certain efficiency. The costs that are

there are the research and administrative costs. Another benefit is in terms of equity; the people who gain the most from those most efficient appliances pay the most. To gain the most, you pay the extra first cost when you buy the appliance; whereas in a rebate program the costs are spread over the entire ratepayer base.

When comparing these three different policies, I should point out they are not mutually exclusive. A program can easily include aspects of all three. Having standards does not mean that you are going to stop the market from increasing efficiencies above those levels. Standards are rarely set at the minimum life-cycle costs so consumers still have a significant interest in buying more efficient appliances.

Similarly, you can set a standard and have a rebate program to encourage people to adopt the standard level early and to encourage people to buy appliances that are well above the standard level, which encourages research and development of even more efficient appliances by manufacturers. You can use the three different approaches in concert; one does not exclude the others.

I am going to go on to the opportunities for Ontario. In the time I have had to prepare for this testimony, I have not been able to make any estimate of real savings or what would be appropriate standard levels. That is best left to a more involved research effort. Generally, there are three areas involved in setting standards that all contain a significant conservation research. The first is residential appliances. They are of particular interest to me because I am dealing with them in Massachusetts.

It is worthwhile to point out that there is a lot of uncertainty involved in these. California and Massachusetts and eventually the department of energy will adopt quite efficient standards. That may have an effect on the efficiency level of appliances here in Ontario; what that affect will be is uncertain. In 1978, California established appliance standards and they became a de facto national standard in two or three years. They did not become a de facto continental standard.

Appliance efficiencies in Canada remain low. Right now they are significantly below what they are in the US. The standards that are being considered or that have been adopted in California now may become a continental standard and efficiencies may rise very quickly here. It may affect them slowly and they may rise to some degree of what they will be in the US. On the other hand, it could be that manufacturers will sell their inefficient appliances here and their efficient ones in the US. Appliance efficiencies could decline here without standards. It is really not clear what appliance efficiencies will do.

I made a quick calculation on the basis of Ontario Hydro's forecast. I calculated the difference between what the band would be from residential appliances if appliance efficiencies rose to the same level that they will in the US, or alternatively stayed at the same level they are at now. On average, there is 800 megawatts of uncertainty in the jaws of those two forecasts just from half a dozen residential appliances. I would hesitate to say exactly where it is going to come out between those two.

In the second category, commercial buildings, there is also quite a bit of resource available, lighting in particular. There is quite a bit of excess lighting. One area of conservation is to reduce the lighting levels to those recommended by the Illumination Engineering Society. Typically, the IES recommendations are taken as minimums rather than as points you should be

shooting for, so lighting can be three to four times too high. In line with this, the National Research Council apparently has recommended that 110 per cent of the IES levels be set as a limit.

In terms of cost, this actually saves money because not only do you have to buy fewer fixtures, fewer bulbs and less wiring, but also you need less air conditioning because of the reduced heating load from the reduced lighting. This has a lower first cost, besides saving quite a bit of energy.

The other way you can save on lighting is by more efficient fixtures, bulbs and ballasts. In estimating the savings for Massachusetts, more efficient ballasts for fluorescent lights saved almost half of the total energy we were forecasting to be saved. Not only are they efficient ballasts, but also solid state ballasts, which are the equivalent of a solid state stereo compared to a tube stereo. They are much more efficient, they allow for continuous dimming and save a lot of energy.

The final category is residential buildings which I have divided into new construction and current housing. By establishing standards similar to those recommended by the National Research Council, you could save a lot of energy in new construction. A quick estimate of savings available is that if Ontario adopted the measures for similar climate regions in the northwest that are not adopted in the current code, it would save about 15 per cent of the total natural gas demand for the year 2000 in Ontario from those measures alone in new construction.

Similar savings are available from retrofits of current housing. Current housing tends to be less efficient than new housing. It will account for a large fraction of the demand in 2000. A recent program by Bonneville Power Administration and Pacific Power and Light in Oregon found that with high levels of incentives--basically they have decided to pay 100 per cent of all cost-effective conservation measures--they got close to 100 per cent participation, close to 100 per cent installation of all cost-effective measures and cut consumption by about 50 per cent of current levels. Their market has been shown to be susceptible to conservation programs.

That is all I have prepared. I would be more than happy to answer any questions.

Mr. Charlton: I have a couple of very quick and brief questions. You have talked about the pending standards legislation in Massachusetts and the existing standards legislation in California. As well, I think you mentioned standards which will be coming on stream in California, such as timed.

Mr. Miller: Yes.

Mr. Charlton: New standards. Did you say 1988?

Mr. Miller: Yes. California has revised its refrigerator and freezer standards in a two-step process. In 1988, new refrigerator, air conditioner and freezer standards will take effect and cut consumption to about 75 per cent of the previous standard. A second tier will cut consumption to 50 per cent of the original standard in 1992 and a second air conditioner and heat pump standard will take effect in 1993.

Mr. Charlton: I do not know whether our staff already has that legislation from both California and Massachusetts. If it does not, can you make the standards legislation available to us?

Mr. Miller: Yes. I should also point out that New York has standards and a number of other states are considering standards--Nevada, Oregon, Vermont, New Jersey. I just heard that Rhode Island has a bill it is going to introduce. Florida had a bill last year it is going to reintroduce. A number of states are looking at them.

Mr. Charlton: The other question I have is, since the process is currently going on in Massachusetts, perhaps you can tell us a little bit about the political part of that process. What kind of political opposition is the standards legislation running into? What kinds of lobbies are evolving in support of and in opposition to that legislation? What can we look forward to as we move down that road?

Mr. Miller: I am actually more familiar with the political situation in the California proceeding.

Mr. Charlton: Whatever.

Mr. Miller: I am sort of a techie on Massachusetts. I have been at home in doing the forecasting.

2:50 p.m.

Somewhat surprisingly, the primary opposition in California was from the manufacturers, since it means they are making more money from the standards. Basically, it is a transfer of payments; instead of paying the utility, they are paying money to the manufacturers. Of course, they get a profit on whatever they make. They tend to make more money on standards. It requires some engineering work, but the estimation is whatever it costs plus a 100 per cent or 60 per cent markup, whatever it is. The primary opposition--and very strong opposition--was from the appliance manufacturers such as White and Westinghouse.

Everybody else basically supported the standards. Consumer groups and environmental groups were very much in favour. Utilities were in favour to a mixed degree, some lukewarm, some very strongly in favour of standards. I do not think there was any opposition from any utility in-house commission staff which did basic analysis. In sum total, the only opposition was from the manufacturers. There was a lot of support from public interest and consumer groups.

Mr. Charlton: Perhaps you can tell me a little bit about the utility in Massachusetts. Do you know very much about it?

Mr. Miller: A fair amount.

Mr. Charlton: I was in Boston a couple of years ago with one of the committees from the Legislature, and my recollection is that Massachusetts has very little or no generation capacity of its own. For the most part, it is a purchased system.

Mr. Miller: As far as new capacity is concerned, that is true. They have a significant amount of base-load capacity that they are relying on, but are not planning on building too much now. They have the Seabrook, I guess, although that is in New Hampshire, but there is a fairly close intertied system in the northeast. They are a building couple of plants. They now are buying electricity from Canada. They have had a lot of problems recently with the nuclear plants and prefer not to build any new ones. They do have a fairly substantial base-load capacity there though.

Mr. Charlton: Do you know what kinds of problems they have run into in their approach to purchase offerings from other utilities?

Mr. Miller: I do not know that much about the purchase power in that region.

Mr. McGuigan: Can you tell us about any experiences people have had with retrofitting buildings; the sorts of problems and costs, politically and economically?

Mr. Miller: Homes, residential buildings?

Mr. McGuigan: I assume you would be more apt to do apartment buildings than individual homes, but in either case.

Mr. Miller: Actually, both are quite available. Both have been looked at and studied pretty extensively.

One of the problems in doing that is people tend to do the cheap measures and not get all the cost-effective measures. It costs a lot of money; it is a lot of trouble; it is hard to reach a lot of people. As I mentioned earlier, in this recent program in Hood River, the utility decided it would buy everything that was cost-effective to the utility. It was going to pay for 100 per cent of the measures that cost less than it would to build a generating station, and it got over 90 per cent acceptance from the community. Everybody said, "Sure, come on in. If you want to insulate my house, I would be happy for you to do that." That seems to make sense to me, if somebody wants to save you money by saving energy, and pay for it.

Mr. McGuigan: Did the utility have the crews come in and do this?

Mr. Miller: Yes, it hired local contractors. It was a very intense local community effort. It hired local people to do the project; it hired local contractors, tried to get local manufacturers to build the triple-pane windows and installed more insulation. The one problem it had was with air-to-air heat exchangers, which are a fairly new technology. That took a while to get up and running. Costs tended to be high at first because there were not very many people making them or selling them. Since then, costs have come down. It takes a while to train people. That is one of the problems. You have to develop a base of contractors and builders who know how to go in and retrofit a house.

The other problem tends to be with people skimming off the cream, as it were. They install the most cost-effective measures and do not really get in there and develop the full resources. You get a small amount of the resource developed, very cost-effective, without developing the large base of resource you have estimated to be available. In terms of developing a resource for the utility, that is a problem. If you were to build a hydro dam and ended up being able to get only 10 per cent of your capacity, that would be a real problem. It is a matter of looking at how you can develop a policy that will develop that resource.

Mr. McGuigan: If the utility were paying for this, you would think they would set the standards.

Mr. Miller: Yes, and that seems to have worked.

Mr. Sargent: Pacific Gas and Electric Co. is making $200 loans available across the board to people who will rewire their houses.

Mr. McGuigan: You are saying that people would tend to put insulation in the attic and ignore other things?

Mr. Miller: People tend to do that. The more control the utility has and the more it decides it is going to pick up the cost, the more it can determine what measures get installed. It is hard to tell people they should pay for something in a house that is already there, that they have to pay to install more insulation or whatever it is.

Mr. McGuigan: To look at the other side of that, government action, do you know of any governments that have changed the building standards and said these buildings must be retrofitted to the new standards? Do you know if any have ever done that?

Mr. Miller: I do not know of any government retrofit programs. There is a United States program where utilities have to go around and audit houses. They have to go around and tell people how they could save energy, estimate how much they could save and tell them how to do it.

Mr. McGuigan: We have done that here.

Mr. Miller: But there is no requirement that one has to install that or pay for it. I do not know of any, but there may be.

Mr. Charlton: On the retrofit question, you mentioned the Hood River experiment where the utility paid not only the cost but also hired the local contractor, set the standards and supervised the work, I assume.

Mr. Miller: Yes.

Mr. Charlton: We have had some limited conservation and insulation programs in Canada in the last decade. We had some success with those programs. We also have had numerous and wide-ranging horror stories, because there was no central control over the program, except for the funds. Contractors blew attics full of air and all kinds of other things went on. If we are looking at retrofit incentive programs, or perhaps even utility direct investment in conservation, would you recommend that they essentially have to be run centrally? Are there examples in the US where a program has been designed that was not administered directly?

Mr. Miller: There are examples of programs which have not been directly administered. None of them has achieved close to the penetration or compliance rates the Hood River program has. Basically, the Hood River program seems to show that people have a very steep threshold. You get the energy buffs, and no matter what you pay them-- You pay them a penny and they will do it. That stays fairly low. It climbs slowly. Then all of a sudden, when you start paying 90 per cent to 100 per cent of the cost, everybody wants to do it. People say, "If it is going to cost me $10, I do not think I am going to do it, but if you are going to pay the whole thing, okay." There is a steep threshold at that point. That becomes a sensitive parameter, the level of payment by the utility. When you are paying that much for the measures, it is important that you make sure you get the work done. Close management is called for.

Mrs. Grier: I have some trouble understanding what the definition of a standard would be. You talk about appliances. Where does the standard come in? Does it come in on the amount of power used or in the construction of the appliance?

Mr. Miller: No, it comes in demand for the appliance. It is not that you actually measure what it will use in the house. You test a manufacturer's appliance. You develop a standard test procedure by which you estimate how much electricity, gas or oil that appliance will use in a typical home. You set a limit on the maximum electricity or alternatively the minimum efficiency.

3 p.m.

Mrs. Grier: It is then up to the manufacturer how he meets that standard, whether he does it with increased insulation or a better compressor or some other way?

Mr. Miller: Absolutely.

Mrs. Grier: Do you necessarily get all the potential? Could it be an either/or situation, that he could either insulate the refrigerator or put in a better motor, and does not have to do both, whereas if he did both he would save even more power?

Mr. Miller: That depends on the standard. If you set the level high enough, they may have to do both. Typically, levels we are talking about now do not require that extreme of measures.

Mrs. Grier: Yesterday we had a discussion on Energuide, our labelling program here. The only appliance I could find in my house with a label on it was a freezer at 110 kilowatt-hours. How does that compare with the kinds of standards you are talking about?

Mr. Miller: That must be per month.

Mrs. Grier: Yes. That is a freezer. –

Mr. Miller: That works out to--multiply it by 12--1,300 kilowatt-hours per year. We are talking about refrigerator standards around 800 and 400 in 1993.

Mrs. Grier: I am talking about a freezer.

Mr. Miller: With freezer standards of 800 and 400, there would 30 per cent savings and 60 per cent savings from that by the year 1993.

Mrs. Grier: We had some discussion yesterday about the difficulties of it being done here on a province-by-province basis. Presumably the same thing happens in the United States. Are there variations both in the testing and in the definitions from state to state? Does that create problems?

Mr. Miller: There are not definitions in testing generally. The Department of Energy testing procedures are usually adopted, although that does create something of a problem for air conditioners. That procedure depends on the climate zone. You will have an entirely different test procedure for an air conditioner in Florida than you would in Maine. But in general the test procedure is not different. The standard level may very well be different. Surprisingly enough, one of the big arguments manufacturers now have against state standards is that they are going to have a patchwork. That is very difficult to deal with. They would much rather have a national standard. It is somewhat backhanded because they stopped a national standard from being adopted in the early 1980s. They are now arguing for a national standard. Everybody would prefer to have a national standard. It makes it easier for manufacturers, for retailers and for states.

Mrs. Grier: But in your opinion, the absence of a national standard does not undermine the usefulness of having one initially at a state or a provincial level?

Mr. Miller: Not at all. There may be little difference between the two in the case of a state with a large population such as California, in which a state standard costs--it is so much trouble for the manufacturer to make the new ones and so much more trouble to make both that they have decided to make only the more efficient ones.

Mrs. Grier: You are helping everywhere else.

Mr. Moore: In your listing of residential appliances, you listed six appliances. You did not list things such as washers, dryers, heat pumps and air conditioners. Did you feel that those were not opportunities?

Mr. Miller: No, they were not the major ones. That list is by no means comprehensive.

Mr. Moore: I guess that was the question. Is that a comprehensive list or is it just an example list?

Mr. Miller: It is an example list. There are significant savings from all those appliances.

Mr. Chairman: Thank you very much, Mr. Miller. We appreciate your presentation.

Members of the committee, if I could have your attention, there is one small matter with regard to tomorrow that has been raised with me. We have two presenters in the morning and one in the afternon. It has been suggested that we could possibly continue with the third presenter in the morning and thereby adjourn earlier on Friday afternoon.

Mr. Brandt: Agreed.

Mr. Chairman: Is that unanimous? Thank you very much.

Mr. Ashe: May I just add that I have no problem with that because that is the route to go. But we have done that two Fridays in a row. Some people, believe it or not, do make luncheon commitments. If we are going to decide that for next Friday, let us decide it now so that we do not make commitments for next Friday at lunch hour, such as I did for last Friday and tomorrow. Do it. That is fine. All I am saying is why the hell do we not decide that now?

Mr. Chairman: I will put one proviso on that arrangement. It is that we can start promptly at 9:30 tomorrow morning.

Mr. Haggerty: How about nine o'clock?

Mr. Chairman: Mr. Haggerty, we have not made it at 9:30 yet.

Mr. Gordon: The other proviso is that a week from tomorrow will see that we do not fool around with the noon hour.

Mr. Chairman: You will recall that next Friday is Hydro's final day. The other matter I would bring to your attention is that next Thursday you

will notice we have scheduled one witness at 9:30. When that witness has completed his testimony, what we plan to do is sit through lunch--we will have lunch brought in here--to discuss the testimony to date and to perhaps provide Hydro with some guidance--I hear to Friday; it may be short notice, we appreciate that--on what areas we may wish it to address during the presentation on Friday.

Mrs. Grier: We were planning to stay up all night anyway.

Mr. Chairman: I notice Mr. McConnell's eyebrows raise. I appreciate it may be short notice but I think it is important that before all of this testimony escapes us we have a chance to consolidate our thinking a little bit.

We will be sitting Thursday morning right through lunch. We will have lunch brought in here. That will be an in camera session. It will be in camera following the witness's appearance.

So what do we wish to do about next Friday lunch, considering the fact that I am sure Hydro will have some testimony beyond lunchtime? My recommendation is that we break for lunch, but it is up to you as members of the committee.

Mr. Ashe: Again, I have no problem with that but I will bet my bottom dollar right now that if more than half the committee is here after three o'clock, I will be extremely surprised.

Mr. Gordon: Considering it will be a Friday, and considering that so many of us have a distance to go to get back to our ridings, would it not be more prudent to say that we will have lunch and carry on?

Mr. Chairman: Could we agree, as a compromise, to a short break at about noon for half an hour and then come back?

Mrs. Grier: We need more than half an hour.

Mr. Charlton: You will not see us back in half an hour.

Mr. Ashe: The key is that everybody goes down and grabs a sandwich and soup, or whatever, and brings it back up. Doing it that way will be half an hour.

Mr. McGuigan: Why not just bring it in?

Mr. Ashe: Is that possible?

Mr. Chairman: The clerk tells me she will prepare half a dozen sandwiches each but Mr. McConnell is to prepare the sandwiches for Hydro.

Mr. Ashe: They get only vitamin pills.

3:10 p.m.

Mr. Chairman: Our next witnesses are Messrs. Tamblyn of Engineering Interface Ltd. Would both of you like to take seats at the table, please? We can arrange to have the slides flipped for you.

Mr. R. T. Tamblyn: Could I come around?

Mr. Chairman: We do not have the travelling microphone any more. Who is going to talk? That is all that is important.

Mr. R. T. Tamblyn: We are both going to talk.

Mr. Chairman: If you are both going to talk, you had better take Mr. Richmond's seat here so that you can be heard in the microphone.

ENGINEERING INTERFACE LTD.

Mr. R. T. Tamblyn: We are here on behalf of Engineering Interface Ltd., which is an energy management group that has been in business since 1973. We preceded the Arabs' post-graduate degrees in cartel management by about six months. Once they found the hang of that, we have been quite busy ever since.

Our mission statement is to provide innovative engineering education and building information services for the design, maintenance and operation of cost-efficient and environmentally comfortable buildings. I think anybody who has tried to write a mission statement will realize that it takes weeks to come up with it and get all the words together so that everything is there. But we have clients among all branches of government and in all forms of the private sector.

The reason we are here today is to talk about ideas which would foster the energy conservation ethic on the demand side of energy management. We called the Ontario Ministry of Energy to get the latest fix on the amount of energy that is used in Ontario and, in terms of something called a petajoule, the amount of fuel greatly outweighs the use of electricity. This is by no means all of the fuel. We have fuel for transportation. We even have fuel not shown here to produce a third of the electricity. But they are very large numbers.

Perhaps more meaningful to us is the cost of that fuel. Because fuel is worth a third as much as electricity for useful heating value, you will see that fuel use for buildings is worth in the order of $2 billion a year while electricity, although a smaller heat value, is actually worth more than $3 billion.

As far as the conservation potential is concerned, our work has perhaps been more on the fuel side simply because the opportunities for saving are much greater there; perhaps in the order of 25 per cent. That is, after all the work that has been done to date, we still have something in the order of 25 per cent that we can save in hospitals and all the other buildings we are talking about. I think the reason there is so much parasitic use of fuel is simply that it is so cheap. Electricity has always been more expensive and it is logical that we are not going to save quite as high a percentage. However, we do see a possibility of saving 12.5 per cent, all assuming that we are talking of payout periods within five years.

The rationale we have for energy conservation is simply that in our view there are lots of measures within five-year payout which are obviously going to be cheaper, as far as the electric side is concerned, than it is to generate new capacity. If we have less spending on energy, then we have a better living standard and our economy is more competitive. You have to find the debentures for new electric generation and anything that can be done to reduce that is going to be good for the economy.

Our firm has been working in all these different kinds of buildings. You will notice two thirds of this part is where we live and the remaining one third is basically where we work. When you consider there are nine million people in Ontario, that works out to each one of us having 600 square feet. There are 400 square feet to live in and 200 square feet to be born in, to work in and to die in. That is also about the average for all of Canada.

Some years ago we did some work for Dr. Porter in his reporting to you. He wanted to know how much area there was in each of the major building categories and there they are. This is area in millions of square metres. He wanted to know how much electricity was used in each of those categories. We we have the average watts per square metre used in each of those. That times the area equals this column, which is megawatts of capacity in Ontario, and that is where our 20,500 megawatts was used last year in all those building categories, and this is our opinion of how much can be saved in demand stripping in each of those categories, a total of 2,565 or 12.5 per cent.

Is it fatuous to talk about shaving on demand when we already have plenty of capacity? It is interesting that on this curve here we are with the peak capacity that we used in each of the past years up until the end of 1985 where we are at 20,500 megawatts or thereabouts. Here is the capacity we have installed. Here is the mothballed capacity that we can have on line within a year, although not being used today because it is uneconomic by comparison with the more economic mix we have below, the lower line. We hope we will not have to use that at all.

From this point onward we are not sure exactly what the rate of escalation will be. I think you are talking about it being 2.5 per cent in general so there is a 2.5 per cent curve running out here, intersecting around the late 1990s. On the other hand, we cannot help but look at the fact that since 1982 we have had three years which have averaged more than five per cent. In 1980-82, we were flat back here with our recession but, as things picked up, since then we have increased the use of electric demand. If we produce a five per cent curve, we will be very glad that Darlington will be on line when it is. Realizing that it takes 10 years to generate new capacity, it might be a very good idea to think in terms of putting this conservation in effect along with new capacity so that perhaps we will be having to delay the new capacity by three years.

3:20 p.m.

I should emphasize that this 12.5 per cent is a one-time-only thing in terms of five-year payback, we can do it only once, but it seems that this is not a bad time to think about doing it. Our friends at Ontario Hydro tell us that in planning, if we are thinking of nuclear generating capacity, we may be talking of $2,000 per kilowatt; coal-fired is a little less. Working in the business of saving kilowatts of demand, we find that most of the things we do that are cost effective within five-year payback are running between $500 per kilowatt saved and $1,000 per kilowatt saved; a much smaller number. We talk a bit about those savings a little later on.

Not only can we save the kilowatts cheaper than we can generate them, but there is the question of operating the kilowatts and the 2,675 kilowatts that we could save would cost $400 million per year to operate, some of which is fuel, some of which is salaries and maintenance. If we saved them, it would not cost anything.

We could not help but look at a page in a report that you have which

shows conservation compared with generation in dollars per kilowatt-hour. It is interesting to us because we are looking at conservation as being much bigger than that. First, it starts at zero where you can do things for nothing by simply turning things off. It also goes out into totally uneconomic regions. Where we have been doing our work is back here where we have the solid red area, and that is what we are talking about when we talk about the potential for 12.5 per cent saving.

We have conservation in relation to payback. Our 12.5 per cent is buried in the zero to five years. This is not to say there are not other things. If we were to look at everything that is cheaper than the cost of new generation, we would probably be looking at five to 10 years, which would include this much more, and 10 to 15, which would include that much more, and so on. We have a greater lump. We are looking very conservatively at the first lump, the zero to five years. It takes a long time to do energy conservation. First, it requires quite a bit of money to do it, averaging between $500 and $1,000 per kilowatt saved. At $750 per megawatt times 2,565 megawatts, it is a $2-billion effort. Over 10 years, it would be $200 million per year. If we do not do this, we may have to look at that, which is to generate an equivalent amount of 2,565 megawatts, which at $1,750 per kilowatt is a much bigger number.

We are concerned about where the people will come from to do this. If we had a program and could encourage Ontario Hydro to embark upon a more aggressive energy conservation program, where would the people come from? Would they come from Hydro? Would they come from the private sector? Looking at $200 million a year in energy work coming from that staircase we had before, about a quarter of that would be the engineering input--that will be about $50 million a year--about a quarter would be financing cost over a five-year period to get things done and paid out, and $100 million, or half of it, would be for the contracting, equipment and labour.

Fifty million dollars a year divided by the $60,000 a year that the average consulting engineer requires per person means that there would have to be 840 designers involved in order to do this amount of engineering work. Where would the 840 designers come from? We have a pretty good idea where they come from because there are 50,000 professional engineers in Ontario right now; the number now may be 51,000. Ten per cent of the 50,000 are in the consulting business, so there are 5,000 of us fellows, 1,500 of whom are in the business of buildings, and of the 1,500 in the business of buildings, around 700 are in the mechanical and electrical side and thereby able to contribute towards this.

The 700 who are in the business of mechanical and electrical work for buildings generally work on a ratio of three technicians to one engineer, so we really have about 2,800 people who are skilled doing this kind of work right now. We feel that those people hope to be about 90 per cent busy. There is at least 10 per cent spare capacity so that 280 of the 2,800 could be spared immediately. There is another big bunch of 45,000 engineers up in here of which another 280 could easily be spared from engineering contractors who are not part of consulting groups but who would still be very effective in terms of getting this work done and helping with the design. Two thirds of this 840 would come almost immediately from those two sources. A two-year or three-year buildup would easily provide the escalation and the training necessary to bring it up to 840 people.

Ladies and gentlemen, there is engineering capacity to do this work. I would like Tom to talk about exactly what the work might be.

Mr. B. T. Tamblyn: Most of the work we have done in looking at energy conservation relates to the commercial building sector, and most of the end use in energy in the commercial sector is in two areas. One area is lighting energy use and the other, down here in the blue area, is motor energy use.

The measures we have looked at, which have been economic, relate to those two areas of end use. The committee has already heard considerable testimony about the types of things that are available in both the lighting area and the motor area: more efficient lamps, more efficient ballasts, more energy-efficient motors as well as building automation systems to make these things work more cost-effectively.

What we have found in grappling with energy conservation is that first you have a need for information in order to make policy and to decide on programs. The infrastructure in terms of getting that information is not really in place yet. We have information on more than 2,000 commercial buildings now, but as a small business we can afford only to call on people who are large building owners who own many different buildings. We cannot afford to go and talk to the small building owners.

There is an information need out there to look at all the buildings, including the ones that are small in floor area. There is a need to look at information about the energy use in those buildings because they differ quite dramatically.

Lastly, there is a need to look at information about the building characteristics in terms of what causes them to use that much energy. Just as an example here, we have from our own data base a frequency distribution that looks at energy use in both large and small office buildings, and you can see that the electrical energy use varies from about 10 all the way up here to about 40; in other words, there is a four-to-one difference in energy use in large office buildings and there is a similar difference in small office buildings.

We have good information in this area at the moment--for example, in large office buildings--because we get to call on most of those building owners. We have very little information in this area. Most of the buildings in Ontario are small in area; they are below 100,000 square feet in floor area.

Specifically, we would make the following recommendations in the area of information: We need to develop information on building size and building type; we need to go out and collect field data on these buildings and to develop a proper data base of building energy use and building characteristics.

Ontario Hydro is already undertaking to get some of this information now. You may find it interesting that Hydro-Québec has already conducted a study in the commercial sector. They went out and collected information in 2,500 buildings in the commercial sector with a questionnaire that was about 12 pages long. The cost of collecting that information for each building, including sending somebody out there for half a day, was about $133 per building; in other words, the cost of getting that good information on the commercial sector was $330,000.

Not only do they ask for general information on the building in the questionnaire, but they also ask--this is detailed information; I certainly do not expect you to read this--for information about end use such as domestic hot water, laundries and other things so they can put that information into

the data base and use it to help them put together their programs. That kind of detail is required in order to put the programs together.

Hydro-Québec also asked them other market-research-related questions about their intention to convert. Had they in the past considered converting to other sources of energy? If so, in what areas? Were they considering future conversions? If so, in what areas? That was valuable information that they could collect at the same time as they were there collecting information on the building systems.

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In addition to collecting that information, they also collected information in the questionnaire on decision-making. In other words, who is going to make the decision to convert? Who is going to make the decision to change energy source? Who is going to make the decision to do energy conservation, and what is the motivating factor? They have put all this information together in a data base for 2,500 commercial buildings. That is the kind of information we are talking about in order to have information to put policy and programs together.

There are a number of different types of measures that can be put into effect. The two main levels are measures that reduce load and measures that reduce hours of use. Either one of those will save energy. From the utility's perspective the load-reduction measures are more attractive in saving hours of use off the peak. Some measures fall into the category in between, so that there is a priority in what measures are best from the utility's perspective and best in the long run from the standpoint of replacing generating capacity.

As well, all buildings were not created equal in terms of the way they use the energy. For example, if we were to look at a saving of 1,000 gigawatt-hours per year in the lighting area either in office buildings or in school buildings, we could say that office buildings use lighting for long hours; in other words, the lights are on for approximately 65 per cent of the time in office buildings. This would mean that with the 1,000 gigawatt-hour saving we would have 176 megawatts of generating-capacity savings with that conservation.

On the other hand, school buildings have a very short duration for lighting energy use. Consequently, there is a much higher generating-capacity saving. Once again, in that need for information in order to know where we should go after these things, maybe schools are better than office buildings in putting together a program because we get more leverage in terms of saving generating capacity. In other words, the economics are better.

We have really addressed existing-building conservation because that is where most of the buildings are, but we bring new buildings on stream every year and there are measures that fit best with new buildings. The advantage of dealing with new buildings is that we have to pay only for the premium cost to put in something that is energy efficient. For example, in energy-efficient motors all we have to do is pay the premium cost difference between a standard motor and an energy-efficient motor, and so energy conservation is often more cost effective in new buildings.

We can address specific programs such as a motor program, a lighting program, a heat pump program or perhaps even a building-automation-system program, or we can go at new buildings in another way, which would be performance standards, where we are saying that you should design the new

buildings to some specific standard. This is the route that California has taken with its title 24. It has chosen either to implement prescriptive standards or to let the engineers could choose to program the building to meet a performance standard.

At first look, new buildings may not seem all that important. However, we can look at this graphic for a second and think about how important they could be by the year 2000. If we had 100 units of building stock at this time--I am not presuming to say that these numbers are exactly accurate--and if the growth rate in the overall building space were 2.5 per cent compounded every year, we would see the building stock rise from 100 units to 145 units. You might conclude that this was the amount of new building stock we had on line--quite a bit compared to that.

However, in effect, we have new buildings replacing existing buildings that are torn down. We also have the rehabilitation of buildings, where buildings are gutted and new systems are put in. If that replacement or rehabilitation rate were two per cent combined with the tear-down and rebuild factor, we would find, in this example, that by the year 2000 almost 50 per cent of the building stock would be new starting today, so that new buildings are an area in which policy should focus quite strongly because we have the ability to do something about those buildings now and they will represent 50 per cent of our building stock by the year 2000.

One of the questions that is often asked about energy conservation is, if it is so good and so economic, why are more people not doing it. I wanted to talk about some of the barriers that we have seen from our perspective and how they might be addressed.

First, we have financial barriers. Building owners have only so much available capital. Most of them are not in the energy conservation business; they are in the development business. Their first love is building new buildings, and they will invest that capital in new buildings and not necessarily in conservation.

When they deal with conservation they are usually unwilling to look at paybacks that are beyond three-year periods and they are uncertain about the risk factor associated with conservation technology. Those financial barriers often prevent more people from considering energy conservation as an alternative.

Then we have manpower barriers. We certainly have a lack of time and commitment to conservation. Particularly in view of the falling world oil prices, everyone is becoming quite complacent about energy conservation. Realistically, a building manager spends less than one per cent of his time on energy-related matters.

The other thing we have to address is that conservation is not a Band-Aid solution. It cannot be considered without considering a building operation and the people who run buildings. It is essentially a manpower barrier. Many of the conservation programs that took place before did not integrate conservation with the building operation. The programs have to address that as well.

We have another category of barriers that we have called information barriers. They relate to a lack of awareness of what you can do in the conservation area. There is a tremendous amount of conficting information from people talking about energy conservation devices. They say, "Use this" or "Use

that," and building managers are deluged with a whole bunch of conflicting information. It is tough for them to make a decision when one person tells them that black is white and the next person is telling him that white is black.

It is also difficult to get much information about the new technology down to the building managers. We are in the energy management business. We spend 100 per cent of our time there and we have trouble keeping up with the new technology. You can imagine that if some guy is spending less than one per cent of his time on this, he is going to have a lot more difficulty keeping up with the new things in the area.

There are other specific barriers that relate to the individual building sectors. In the office sector there is such a thing as a net lease. There the energy cost is passed along to the tenant, so the building owner has no particular incentive to buy energy conservation, because the tenant pays for it. Energy cost is less than five per cent of the total overall lease cost. In the high-rise residential sector we have rent controls where, if the guy invests in energy conservation, he gets to write off the investment over 20 years, but he gets docked on rent controls almost immediately so that there is a disincentive to invest in energy conservation.

We have the business of fragmented ownership. As I mentioned before, most of the people in the conservation technology business are small companies.

Mr. Ashe: The question of rent controls triggered some problems. There are various opinions on rent controls and their value.

Mr. Chairman: Carry on, please.

Mr. B. T. Tamblyn: Energy conservation is caught in the backwash on that one.

Fragmented ownership: In the case of building ownership, we have large building owners and landlords and many people who own one or two buildings. They are small buildings and it is very difficult to reach those with small businesses like ourselves. It is not economic for us to call on them and talk about energy conservation. It really requires somebody of Ontario Hydro stature to mount a program that can reach the smaller building owners.

Many buildings, like schools, have one-year budgets. If they want to look at third-party financing schemes and so on, they are precluded from looking at any agreement that is longer than one year, because they purchase everything: They purchase their trucks and vans and they do not lease anything. Thus, they are precluded from looking at things that extend beyond one year. If they do not set money aside for conservation, too bad; they do not do it. They cannot look at some of the more innovative things.

Then there is this issue of air quality. Energy conservation has received a bad name from some of the air quality implications that we have seen in the past. That is ill-deserved in some cases, but it is an issue that we will have to overcome.

In summary, the things we want to say to the committee are that, first, there is a need for market research to get good data on the building stock that is out there in order to target programs effectively for the different building sectors and for different needs.

Next, concerning financial incentives, a variety of things can be done there. By far the most effective is money up front. That grabs everybody's attention quickly.

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Other things that can be done are tax incentives or fast write-offs, for example, to address rent controls. If there were a fast write-off of the energy conservation technology, there would not be a problem with rent controls.

Next, new building programs and standards: There are two types of programs that could be considered here. Perhaps Ontario Hydro could mount a program that would say, "This is a motors program, and we are here to offer incentives for energy-efficient motors in new buildings," or perhaps building automation systems or a lighting program. It could publish that and target the program to specific end uses that could apply to different building sectors after it did the necessary research in deciding where it would be most effective. There is also the standards approach, which is really back to the government side in terms of dealing of dealing with either prescriptive or performance standards for new buildings.

Fourth, task forces for building sectors: Task forces are required to get a combination of utility participation, government participation and private sector participation because the needs in office buildings are different from the needs in schools, which are different from the needs in hospitals. Some input is required in helping to put together those programs, and task forces have shown themselves to be effective, provided they are made accountable and given the ball to run with.

Technology transfer programs will help overcome the information barriers, and they can take many forms. They can take the form of advertising, they can take the form of workshops and seminars and they can take the form of things put on by the building task forces.

Lastly, research, development and demonstration programs can all help, but they have to be oriented towards real buildings and doing things in those buildings.

Mr. Chairman: Would you expand on the task force concept?

Mr. B. T. Tamblyn: Okay. At the present time the Department of Energy, Mines and Resources in Ottawa has put together some task forces, but essentially most of those are dormant right now. The task forces had private sector participation where they solicited participation from the different sectors. In the commercial sector they had a retail task force, a health care task force, an office building task force and so on.

The task force had several goals in mind. In this case, they were designed to get feedback to the government about what programs might be efficient from the private sector standpoint, what it would like to see and to funnel demonstration program funding through to the buildings themselves.

We see other things that the task forces can do. For example, they can help collect some of the market research information so that there would be participation there. They can help decide on the priorities within the building sector in terms of the needs that the private sector sees for policy there. It is just like a steering committee, in effect, for program

development. Both in the initial stages and later on, as you look at the funding of programs, they can help to monitor the conservation progress in the various sectors as well as develop the information.

The last point was the research, development and demonstration programs. Again, a mix of different things can be done there, but the development of new technologies and so on should be linked to things like task forces and the other things we talked about here.

Okay, back to you.

Mr. R. T. Tamblyn: Tom has summed up, but I would like to sum the sums.

Speaking first about task forces, we feel that we have to involve the private sector, and fortunately, every one of the building categories we have talked about has its own energy management committee. The Building Owners and Managers Association International looks after office buildings; we have the Canadian Warehousing Association, the North American hotel society and the international association of shopping centres; we have hospital groups, like the Ontario Hospital Association and so forth. They are all there waiting to work with us.

However, our purpose was to look to someone with the strength of Ontario Hydro and to help make it attractive to encourage it to work harder in this respect. We see advantages to Ontario Hydro in public relations simply because energy conservation is perceived to be good, and certainly in customer relations because anybody who has his energy costs reduced is going to be happy with that. There is an opportunity to step alongside others who are already there. For example, Consumers' Gas System now is out doing energy service contracts. It is helping its customers that way. Perhaps Ontario Hydro could take a strip out of its book and do something similar. It might also look to see what Hydro-Québec has done. It has been much more aggressive in working with customers to get on with solutions to energy conservation.

The advantage would be lowering borrowing for investment because it is cheaper to save a kilowatt than to generate a new one. It takes a long time to do just as it takes a long time to set up generation, so the sooner we start the better. Of great value to Ontario Hydro would be data base acquisition because that would come from the monitoring that would go on with all the work that would be carried out. We would be able to get a free data base just by virtue of getting on with this.

Finally, although Hydro can save a kilowatt cheaper than it can generate one, it does not have to do it for nothing. There are all kind of ways we have seen in the United States and Canada for full or partial recovery, full recovery through revolving retrofit or partial recovery through rate changes or whatever. We do not have to give all the money away even though we can afford to. Even the Ontario government is going to take on a new shine because we are going to have less need to go out for debentures. There is going to be public relations--

Mr. Cureatz: We do not want that.

Mr. R. T. Tamblyn: You do not want that?

Mrs. Grier: Some of us.

Mr. R. T. Tamblyn: I understood we were getting close to a borrowing limit.

Mr. Chairman: Carry on.

Mr. R. T. Tamblyn: I thought there had to be a stop there somewhere.

Mr. Ashe: That is the $2.2 billion deficit of the new government you are talking about.

Mr. Chairman: I do not know that these comments are relevant.

Mr. R. T. Tamblyn: Let us talk about jobs--

Mr. Polsinelli: Jobs, jobs, jobs.

Mr. R. T. Tamblyn: --because $200 million a year worth of work at $40,000 a year, which is a nice rate of pay, is 5,000 jobs to be fed into the economy to do this. It is a good way because they are going to be home jobs. They are not going to be jobs in Alabama or Arkansas; they are going to be jobs right here. Anything we do is going to improve the competitive edge. If we are going into free trade, we need it right now.

The advantage to the ratepayers is they are going to pay less. They are going to benefit from better employment in the province. We are going to have a better competitive position vis-à-vis the Americans and our other provinces. We are going to have a better lifestyle if we have more cash.

Mr. Haggerty: Can I have a little more explanation of item 4, reduction of welfare?

Mr. R. T. Tamblyn: If we are going to have 5,000 people working and making $40,000 a year instead of taking $12,000 each from welfare, 5,000 times $12,000 is $60 million. I thought that was too small to bother with so I just passed over it.

Mr. Ashe: Good arithemetic.

Mr. R. T. Tamblyn: Because this seemed to be too good to be true, we went to one of the largest accounting firms in Ontario and said: "This is going to look like found money and somebody is going to say, 'It will not work; there must be something wrong with it,' so what is wrong with it? Come up with things that are going to be perceived to be wrong."

The first question we got from them was whether Ontario Hydro can give away capital goods and services to customers who are perceived to be affluent. What happens if we go down to York Centre to fix up Olympia and York's building and save it $100,000 a year? What is the ratepayer going to think about the money we spend on that?

Is it unreasonable to do something as long as there is a good stated policy, as long as we are serving everyone, as long as everyone knows what we are doing and why we are doing it, and as long as there is an orderly progression in spending the money? Surely not.

Should Ontario Hydro give this money away simply because it is cheaper to it than to generate it? Not necessarily. Consumers' Gas is not giving a cent away. They are doing energy service contracts. They are not only making

the money that they are spending but they are also making interest on their money and are making a profit as well.

Mr. Haggerty: Is that why there was a takeover?

Mr. R. T. Tamblyn: Was there a takeover?

Mr. B. T. Tamblyn: Hiram Walker; Consumers' Gas.

Mr. R. T. Tamblyn: That is right. I forgot about that.

Mr. B. T. Tamblyn: It is too soon to tell about that.

Mr. R. T. Tamblyn: I am not sure whether there is going to be any discount on liquor.

Mr. Ashe: They are going to mix it with the gas.

Mr. R. T. Tamblyn: Ten per cent ethanol. That is with Hiram Walker; that is why it is going to be so valuable in the future.

We do not think Hydro has to give anything away for nothing. We think people who are going to save 10 cents are willing to give eight back in terms of an increased rate. As long as they are saving, there cannot be much of a problem. There is nothing to say that Ontario Hydro could not be a quasi third-party financier, juat as Consumers' Gas and Hydro-Québec. They have the benefit of longer-term financing to do lots of things that cannot be done on a three-year payout basis.

At the base of everthing is that Hydro is in business to generate and sell electricity in the most economical way. What business would it have trying to save electricity? Does that conflict with its real role? The answer is that the best real role for Ontario Hydro is to provide the best possible service to its customers. How could it avoid helping customers to save parasitic energy they did not need to spend in the first place? It makes for a better customer and a better interface.

Could Ontario Hydro organize itself to carry out the program? Of course. Ontario Hydro has had an energy conservation division for at least 10 years. It has a lot of experience. Besides, the private sector is itching to work with Hydro. That would be the best combination. We could have the societies and the engineers I was talking about working together in an integrated task force.

Finally, one last shot: Suppose Ontario Hydro invested in conservation with one customer. Does that not mean all the other ratepayers will have to bear the cost? Is that not unfair? The federal government had a Canadian home insulation program grant. If you took advantage of the CHIP grant and I did not, am I going to go around screaming it was unfair to me because I am a taxpayer and I had to pay for the work that was done there? I had an equal chance to go after the CHIP grant.

Mr. Ashe: Not if you had a new house.

Mr. R. T. Tamblyn: How can I complain? The same thing is true here. There will be no complaints as long as there is equal opportunity, as long as there is a stated policy and as long as we follow it through.

Thank you for your interest. I hope we have put in a spoke to help to encourage Ontario Hydro, which seems to be the most logical entity, to take what is a simple benefit sitting on the table waiting.

Mr. Ashe: I could not qualify for a CHIP grant because my house was too new. Yours probably was too.

Mr. Chairman: Will you go back to the table? Then we will not have a problem with the microphone.

Mr. Ashe: That was not really my question. While you are walking over, I will pose it.

I would like a little clarification of your view since both of you are in the energy industry. There have been differences of opinion among the experts during the past few days, and even today, as to what is reasonably saleable in the marketplace vis-à-vis a payback. One of you has made specific reference in all his discussions to a five-year payback and the other talked about a three-year payback. Earlier today we had somebody who said it was a maximum of a two-year payback, and somebody else said even with less than a two-year payback there has to be some other form of incentive to get the consumer to react. I am not disagreeing. Theoretically, any of them is financially attractive or should be. The differences in opinion seem to be that when reasonable market forces with reasonable availability, marketing, selling, advertising--call it what you will--are put out, the reaction does not take place to any significant extent. I would like your views on that and on the differences in opinion about five years, three years, two years and anything less than two years.

Mr. R. T. Tamblyn: I will start by saying that our various clients have various views and there is no single view that pertains. A good many responsible developers of real estate will look to anything that will save on a 10-year basis, if it is something such as insulation that would be very expensive to change later on. Some people were putting thermal storage in large buildings at a five-year and six-year payout because it would be very complicated to put it in later on.

Once the building is up and they are looking at a rate of return and hope to have the building paid off within five or 10 years, they do not want to advance more money against a thing such as that as a rule unless there is a three-year payback, although some will talk about five years. A city such as Calgary, which was putting up its new municipal building, will talk initially about anything with a 10-year payback and subsequently about anything with a five-year payback. They said: "It is our money. We are going to own this building for ever, so we are going to have anything that is good."

Other people have other constraints. A large department store chain had an opportunity to have a 1.5-year payback but could not see itself getting on to that program even though its best new store did not have a payback in less than five years. The reason was that when the directors met they said: "We have only $35 million to spend this year. If we are going to preserve our place in the market, we have to get seven new stores built. If we do not do that, the competition is going to swamp us. We have to be there. We are not thinking in terms of payback. We are thinking of the long term and our place in the market. That is where we have to spend our money. This idea of energy conservation is very good, but we will have to leave that for the time being because every dollar is allocated to preserving our place in the market." That is the way directors think.

We find that surgeons are the best salesmen in hospitals. They like to have new diagnostic equipment and that is where the first dollar goes. The guy who is running the plant has to make do with baling wire because he is way down the line in priority. The board likes to see its name on the front page for doing this and that. It usually gets it there by buying fancy new equipment, not by buying a new boiler or replacing tubes. Consequently, help is needed from someone to move these things along.

One of the ways we are suggesting to do it is through a rotating investment. The savings will pay for it. No investment is needed at all, just bridge financing.

Mr. Ashe: I do not know whether there is a further response from the other Mr. Tamblyn.

Mr. B. T. Tamblyn: I do not have anything to add to that. As you can see from some of the slides we showed, there is a tremendous variation in buildings in terms of their size and energy use, as well as in terms of the owners' perspectives. Many of the barriers I talked about apply specifically to certain building sectors such as the business of the net office lease. Even within the office sector there are a number of different developers with different policies in their leases. Some are quite a bit more enlightened and have clauses in the office contract that say that if the landlord sees it is in the tenant's best interest to invest in energy conservation, he reserves the right to make the investment and charge the tenant. Others do not have those leases. They have older, long-standing leases that have been in place for a period of time and their criteria are quite different.

Mr. Ashe: Your experience has been with the institutional and commercial sectors. Is it easier or is there a bigger takeup on the investment in energy conservation than apparently there is in the average residential sector? We have heard, and I think we all recognize it even from our own contacts, that a great number of people did the easy things rather quickly. Even with regard to CHIP, which was by all standards a successful program, I am sure there still were hundreds of thousands of people in Canada who could have qualified in terms of the age of their homes and did not take it up. There are all kinds of other little things. We know that people generally do not do it of their own volition. Is it easier and better in the institutional and commercial sectors on a percentage basis? I realize the savings in dollars are much bigger.

Mr. B. T. Tamblyn: On a percentage basis, the takeup has been greater in the commercial sector. We have found one of the major barriers is dealing with the various hierarchical levels inside the commercial sector. In a home owner situation, you have one home owner. That is both a bane and a benefit because there are a lot of them to reach to make every individual sale. In the commercial sector there are fewer people to reach, but in implementing the conservation technology you have to influence all the different levels within the building. We have seen many cases where major dollars were spent on conservation technology and there were no savings, simply because it did not address the human factor in terms of integrating it.

4 p.m.

On the other hand, we have had very successful programs that involved no expenditure of capital on equipment, but rather involved technology transfer programs such as workshops where you brought in building operators, sat them around a table, time-shared engineering assistance, got them to talk to one

another to share their views, and provided education on how to go about the thing. When we had repetitive sessions, we found we could save as much as 10 per cent to 15 per cent of the total energy consumption without spending a dollar on capital equipment. That is one of the problems with the takeup of the conservation technology. If the person is not aware or does not know, you are not going to convince him.

Mrs. Grier: In your summation you pointed out the advantages to Hydro and the advantages to the government. I was somewhat surprised at the stress you appeared to place all through your presentation on Hydro as the entity most responsible for doing this. In view of your interest in energy per se, will you comment on the role of Hydro vis-à-vis the role of the Ministry of Energy and where you best see responsibility for implementation of this kind of policy being placed?

Mr. R. T. Tamblyn: I see Hydro as being very close to the customer. Hydro sells direct to all the farmers. It sells to municipalities that also have a vested interest in doing what they can for good relations and helping customers. The Ministry of Energy is further removed. It is harder for it to set up a program. Ontario Hydro is well organized and has already been in the business of looking at energy conservation. It knows a lot more about how to go about it. It is close to the scene of the action. It seems to us to be the most logical force to do this. It also seems to us that it has only itself to benefit because it is cheaper to do what we are suggesting than eventually to build new generation instead.

Mrs. Grier: We have heard from Hydro about the consultative process it has been involved in as it prepares its own demand and supply options study. Have you lent any of your expertise to that process, or have you been contacted or involved by Hydro in its discussions?

Mr. R. T. Tamblyn: We are happy to say we have been involved with Ontario Hydro. We like working with Hydro. It has been a wonderful client of ours over the years. We did a large study for Hydro last year on load management in terms of shifting loads with thermal energy storage. Tom has been working with Hydro this year.

Mr. B. T. Tamblyn: Yes. We have also done some work on what it refers to as strategic energy conservation in the commercial sector. We have done a study for Hydro in the past six months that looked at the potential for energy savings in the different commercial sectors.

Mrs. Grier: Finally, I was surprised by the examples you gave of what was happening in Quebec. Given the abundance of hydraulic power in Quebec, where would the incentive have come from to provide the data base you described, or as I think you said later, to be better at promoting efficiency than Ontario has been?

Mr. B. T. Tamblyn: The first thing about Hydro-Québec is that it is different in some respects from Ontario Hydro in that it is the retailer of power everywhere in the province, whereas Ontario Hydro does the retailing to certain areas of the province but the municipal utilities do most of the retailing directly to the customer. Hydro-Québec is by definition closer to the customer because it is retailing all its power.

The second thing about Hydro-Québec is that many of its programs relate to encouraging takeup in the excess capacity it has for hydraulic generation. It is encouraging off-oil type programs or dual fuel uses where they are off

oil 90 per cent of the time and are on oil only during the peak. Many of its programs are oriented towards that takeup of the excess capacity as opposed strictly to energy conservation.

In regard to the business about doing the study and so on, it viewed that as good business sense in terms of knowing how its clients were using energy.

Mr. Haggerty: The end use.

Mr. B. T. Tamblyn: The end use; it was trying to build that end-use infrastructure to get a better handle on what was going to happen from a planning standpoint, and also on how to target its programs more effectively in the future. As you can see in some of the latter pages of the questionnaire, they targeted who the decision-makers were, who was going to convert to electricity and what their perceptions were about the use of fuel and why they converted.

Mrs. Grier: It needed this data for marketing as much as for information.

Mr. B. T. Tamblyn: Oh, sure.

Mr. R. T. Tamblyn: And planning.

Mr. B. T. Tamblyn: And planning. It is good for both of those things. The cost benefit to get it at the $133 a building it spends is justified by the variety of end uses.

Mr. Brandt: You mentioned in your presentation that some of the barriers to moving towards conservation programs were the availability of capital, the financial return on investment, uncertainty of risk factor for investment and so forth. It has come to my attention that there are firms that are in business today which will put a program together with an industry for conservation measures that can be introduced. They will accept a percentage of the actual saving over a predetermined number of years, say five years. It would be a package like that. Is that becoming a common thing in the industry? Is that sort of sharing the wave of the future, or is that an unusual package?

The reason I raised it, if I may say so, is it gets around almost all three of the barriers that you have put up because the company that hires such a consulting firm to come in on a shared basis takes a look at the total energy there. If it is $100,000 a year, or whatever, and if there is a $30,000 a year saving, they then share a percentage of that $30,000 a year over a course of five years. So the company really reduces its risk in moving into a conservation area.

Mr. T. Tamblyn: Engineering Interface Ltd. is involved in that area. We offer that type of contract through a joint venture company. We have been active in that area now for two years.

There are a couple of interesting points I should make about that type of business. First, having been involved in it for a while we find that the average time between contact of a customer and trying to get an agreement signed involves a marketing effort of between one year and a year and a half, even though the building owner does not have to lay out any money up front whatsoever. It is all paid for out of savings. The level of marketing effort extends over a year to a year and a half before we can get an agreement signed.

The next thing that the building owner wants to know, even though he is very cautious in dealing with this because it is relatively new, is exactly how this is going to affect his service agreements, and other things. This type of agreement is part legal, part financial and part engineering, as all those aspects to it have to be considered.

From our standpoint, in doing that type of agreement, we have found that it does not pay us to get involved unless the investment is greater than $100,000, simply because it takes a year to a year and a half to get started and the overhead of getting an agreement in place is sufficiently large that for a small investment it does not make any sense.

So we, and the other energy service companies, gravitate towards large buildings, the ones that have the biggest energy-saving potential. We discard all the opportunities in the smaller ones.

For example, we received a request for a proposal involving six ice arenas, from the city of Sudbury. When it came in we added up the energy bills. We estimated 20 per cent savings. We could get $20,000 of savings and we multiplied it times three for a simple payback of three years, because usually an agreement takes place over five years, and including the interest costs you cannot consider anything as a package if it measures greater than three years. We came out with a $60,000 package and we told them it was not worth our time to go up there and pursue it, so we did not bother.

That answers one part of your question. The energy service agreement approach, or the innovative financing approach you mentioned, has been active in the United States for a longer period of time because the cost of energy is higher. It has been active more recently here in Canada, also in Ontario, and we probably will see a relatively small number of companies, after a shake-out period, doing any major work in the field. There probably will be three or four and that will be it. They will be going after projects that are $100,000 or more.

Mr. Brandt: On the one extreme you have the company taking all of the risk with respect to capital investments that can lead to conservation. On the other extreme you have a company like yours taking all of the risk because you know the business, and then taking a percentage of the savings. Are there packages being put together now which have a blend of both? In other words, the company shares part of the risk, you share part of the risk, and you also share a part of the profits as you go through the time frame of the agreement.

4:10 p.m.

Mr. T. Tamblyn: To my knowledge, there are not many. The only example I can cite from our own history is that as a company we have put together a program called "pay as you save," which put our engineering fees at risk. We approach a client and say we are confident in our engineering knowhow. We think energy conservation is possible in the building; our fees will amount to thus and so. We put those fees on the line and we will take them out of the savings as they come along, with provisions for interest.

On the other hand, the building owner would buy the equipment that would be fastened to his building. He would buy the building automation system, the energy-efficient motors or whatever. That would be his investment in the thing. We would be repaid our fees with interest and carrying costs, and the savings would be shared or in some way would flow through to the owner for his repayment of investment.

We indulged in that for a while. From our standpoint, it was limited. As a small business, we could only do so much from the standpoint of cash flow. We could do so many of those things a year.

Mr. R. Tamblyn: We would have to do a fair amount of engineering to find out what needed to be done. The owner would do all the things that cost him nothing. We still needed to have him spend a little bit of money for the things that gave him a one- or two-year payout. He would say, "I do not think I want to spend on that right now." Here we were, having invested the fees, and we could not get a payback within maybe three or four years. We did not expect that. We expected he would finance some of the things. In most cases, we got our money back very quickly, but there were two or three that went on and on like that because the owner backed up and said, "I really did not intend to spend a cent."

Mr. Brandt: That is being up the river without the paddle.

Mr. R. Tamblyn: Then we thought with the energy service contracts, we would have better control of things. We would spend all the money. We would make sure it got done. We would stand there and make sure it operated well too.

Mr. Brandt: Considering one of the comments you made earlier with respect to Sudbury, I would think there is a sufficient number of arenas throughout this province that are ultimately paid for with taxpayers' money. Some application of the principles that apply to one Sudbury arena, or three or five, would apply to the arenas in Sarnia, parts of Toronto and so forth. Why is it not financially feasible for either your firm or some other competitive firm to expand the field of vision and make proposals on a more global basis to the recreation associations or someone who could then apply the use of those theories and engineering principles to a whole series of arenas. They surely are not all that unique—that you would have to do each one on an individual basis, would you?

Mr. T. Tamblyn: You are quite right. They are not that unique. The measures that apply to arenas apply over and over again to the different arenas. The problem we face is one of simple jurisdiction. The ones that it is economic for us to approach are those around our home base, such as Scarborough, the city of Toronto and so on, where there are multiple arenas. Then as you look at the other municipalities, they have one or two. There is an increased marketing cost to go out and get them.

In the case of arenas, the Ministry of Energy has an active program called MEAP, which stands for municipal energy auditor program. Many of the municipalities took advantage of that program and hired energy auditors, who are at work and actively doing things with arenas. Recently we gave a workshop presentation to the municipal energy auditors and we talked about all the common measures that could be applied in arenas. Many of those energy auditors, who are subsidized under the MEAP program, already are busy doing things in the arenas.

Mr. R. Tamblyn: There also is something else that is individual for every job; that is, the operator has to understand it. He must relate to it and work with it properly. With every single job, whether it is here in Toronto or up in Dawson City or somewhere, we have to budget time to go there and sit down with the operator for a day, two or three, to make sure he understands and is going to follow through. When he gets fired the next month and a new one comes on, we have to go back again and do it all over again with the new operator. We cannot avoid some individual site costs like that.

Mr. T. Tamblyn: In many respects, there is an opportunity now with the advanced computer technology to make conservation more reliable in these areas. By that, I mean that in the past we had to rely much more on the building operator and his skills to be able to continue to do the things. If the operator was fired, we had that problem.

With building automation systems, the energy savings can be more secure and when the operator leaves and a new one comes on, the system is in place to do a better job. Many of these selective measures that might be financed, both by energy service companies like ourselves or Ontario Hydro, can be interfaced with building automation systems that can provide valuable feedback on energy monitoring.

Mr. R. Tamblyn: It is a little unfair to say the operator was fired. That is not what usually happens. Usually, we train the operator and he then becomes so valuable to everybody else that he gets a 25 per cent increase to go and work somewhere else. That is why we lose him.

Mr. Haggerty: That sounds better.

Mr. R. Tamblyn: We are only able to look at 10 per cent of the opportunities in Ontario for the reasons that Tom has talked about. Ontario Hydro might be an organization that could do this thing on more of a global basis. That is where we hope perhaps to pin our star as being a collaborative group working in a much larger setup that could address all of the buildings in a much more economical way than we can.

Mr. Chairman: Thank you very much. We stand adjourned until 9:30 a.m. tomorrow.

The committee adjourned at 4:17 p.m. –